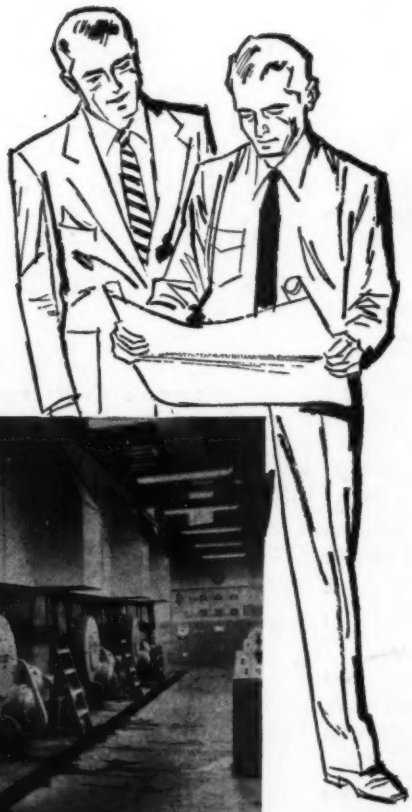
APRIL 1954

The Paper Industry



Count on Lifetime Engineering Service

WHEN YOU USE SWENSON PULP WASHERS

Here's a helpful service you can expect *and receive* when you use Swenson Pulp Washers in your plant. You *always* have the knowledge of our complete technical staff at your disposal . . . brought to you by a competent chemical engineer who can help you obtain the highest efficiency from your pulp washer system. Performance tests will provide a basis for his recommendations regarding chemical loss, dilution, and to solve operating problems. Look into the many advantages of Swenson Pulp Washers *now!* You are assured of continuous engineering service for the *lifetime* of the equipment. Write for complete information!

SWENSON EVAPORATOR CO.
15653 Lathrop Avenue, Harvey, Illinois

Pulp Washers • Evaporators
Filters • Digester Blow Condensers
Turpentine Condensers

SWENSON

Proved Engineering for the Process Industries

SINCE 1889

A Division of WHITING Corporation

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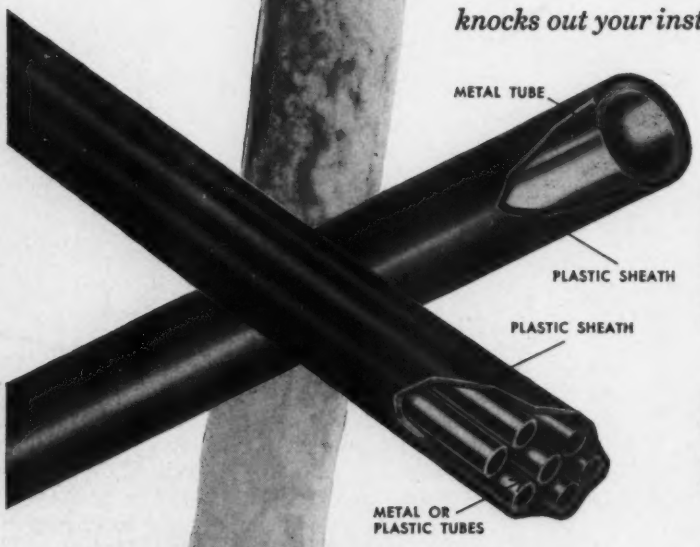
DEKORON INSTRUMENT TUBING

knocks out your instrument line corrosion problems



DEKORON single-line tubing. Samuel Moore & Co. will coat your copper, aluminum or steel tubing by the Dekoron extrusion process, or will supply coated tubing. Straight lengths to 20 ft., coils to 1000 ft.

DEKORON IMPERVAPAK is a multiple tube harness of plastic or metal tubes encased in tight plastic sheath. Multiple tube construction cuts down installation costs.

Corrosion endangers the life line of your plant—your instrument tubing. That's why you should investigate Dekoron instrument tubing, the tubing that's impervious to moisture, salt air, corrosive atmospheres, and chemicals.

That means Dekoron eliminates replacement costs and maintenance. Other advantages are low initial cost . . . less plant down time . . . easy installation with standard fittings and plastic tape.

In replacement savings alone—not including lower maintenance and installation costs—Dekoron Instrument Tubing pays for itself over and over again.

A-7834

Send for free copy of Bulletin L-6506 "3 Ways to Whip Corrosion and High Tubing Installation Costs in Your Plant."

Dekoron® tubing

SAMUEL MOORE & COMPANY
DEKORON TUBING DIVISION • MANTUA, OHIO

Tech

BELOIT AIR GUIDES have been tested by years of dependable service in guiding felts and wires. Air at moderate pressure provides smooth, prompt control at all machine speeds, without any ratchet mechanism. The rugged simplicity of the Beloit design means trouble-free operation with minimum operator attention and low maintenance cost.—*Beloit Iron Works, Beloit, Wis.*

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PAPER MACHINERY

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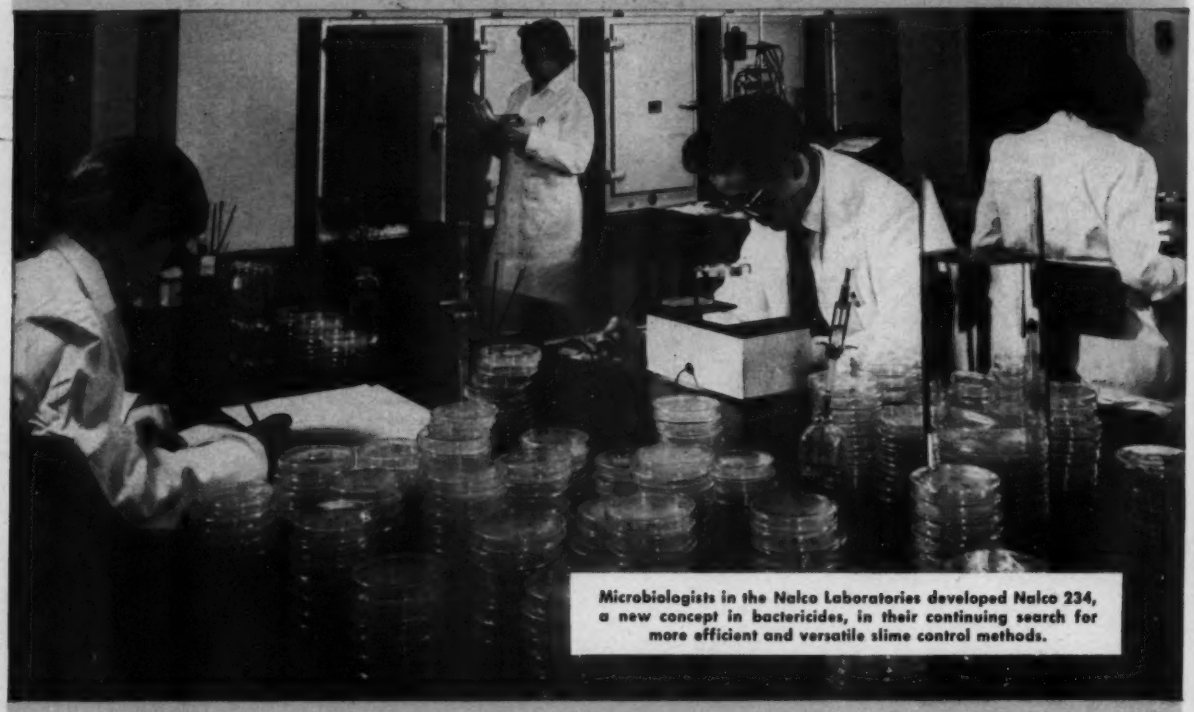
An Entirely New CHEMICAL

NON-MERCURIC • NON-PHENOLIC



Microbiologists in the Nalco Laboratories developed Nalco 234, a new concept in bactericides, in their continuing search for more efficient and versatile slime control methods.

Fast Action SLIME CONTROL

with *Nalco* 234

NALCO 234 is a new organic liquid formulation, developed and proved to meet an industry-wide need for a *quick-killing, non-odorous* bactericide for maintaining clean systems in all types of papermaking—including food packaging and sanitary papers.

Combining the advantages of excellent slime control with powerful dispersing action on fibrous and gelatinous masses in machine systems, Nalco 234 reduces breaks on machines, decreases total down time, and helps produce a more uniform sheet.

Write Nalco, or call your Nalco Representative for full data on fast-action Nalco 234.

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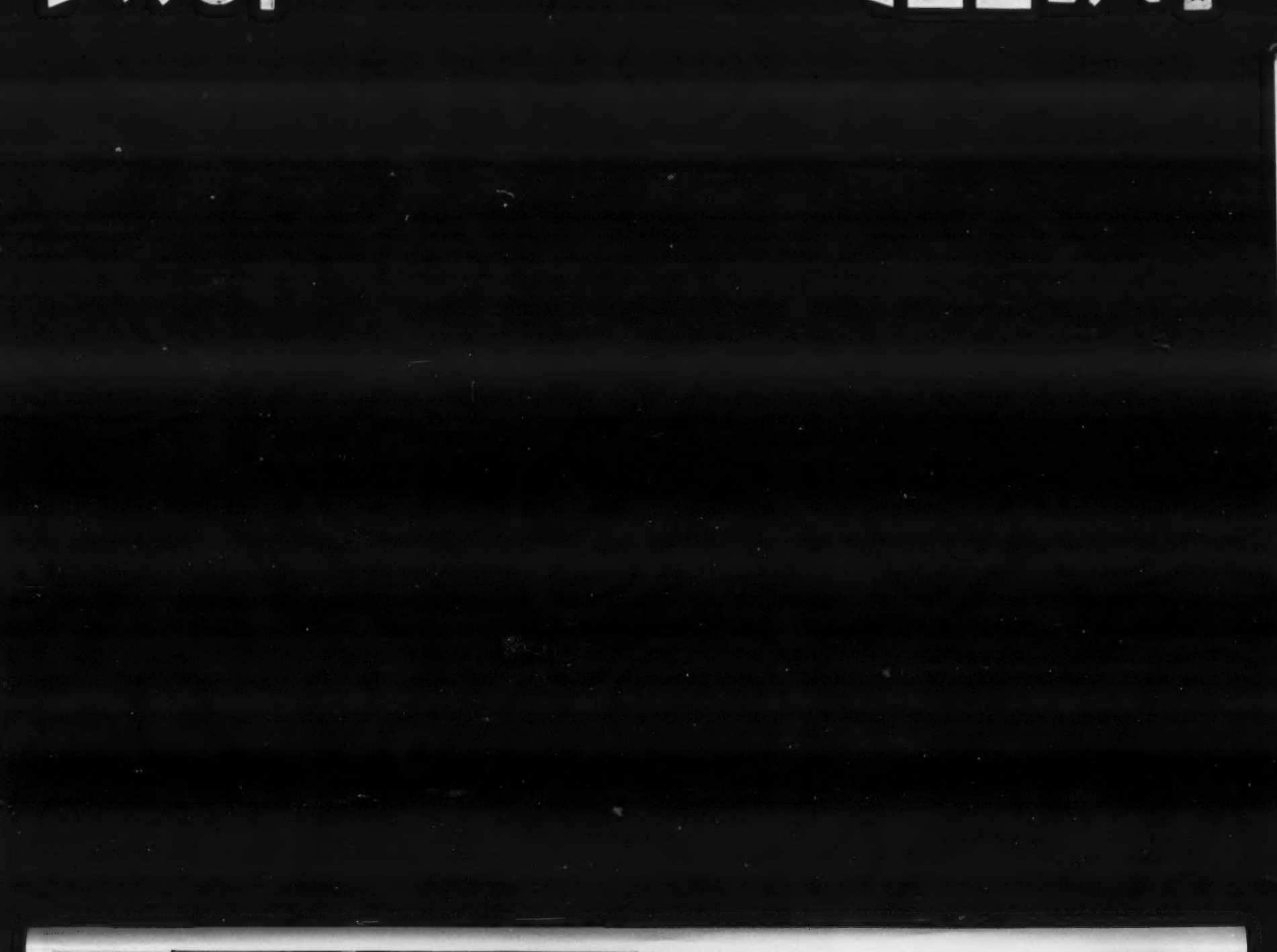
Serving the Paper Industry through Practical Applied Science



The Paper Industry

Technology • Engineering • Management • Production

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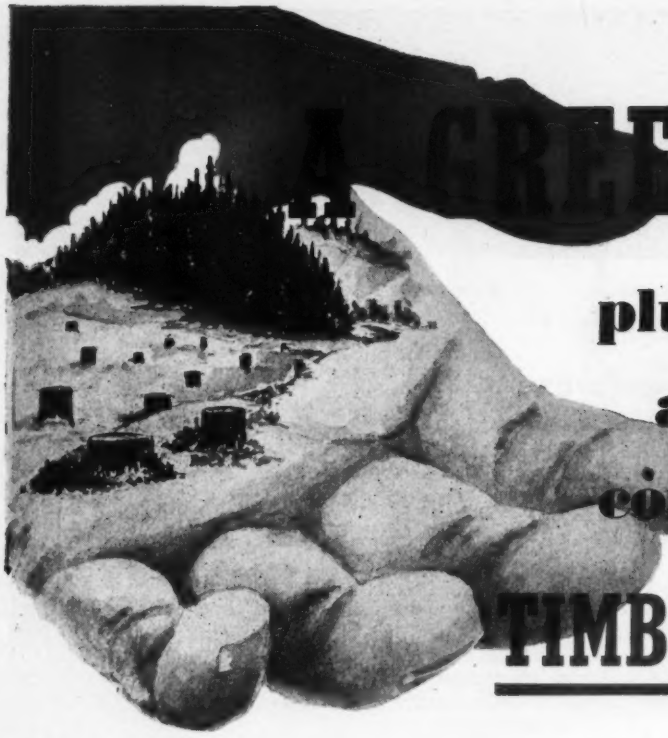

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plus fire, insect and disease control assures

TIMBER as a CROP!

In the Weyerhaeuser long range timber growth plan, blocks of "parent seed trees" provide seeds for new growth trees which will supply a steadily increasing part of the harvest. As these second growth trees replace virgin timber, the science of tree growing will have to solve many new problems of forest management.

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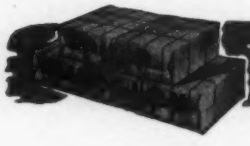
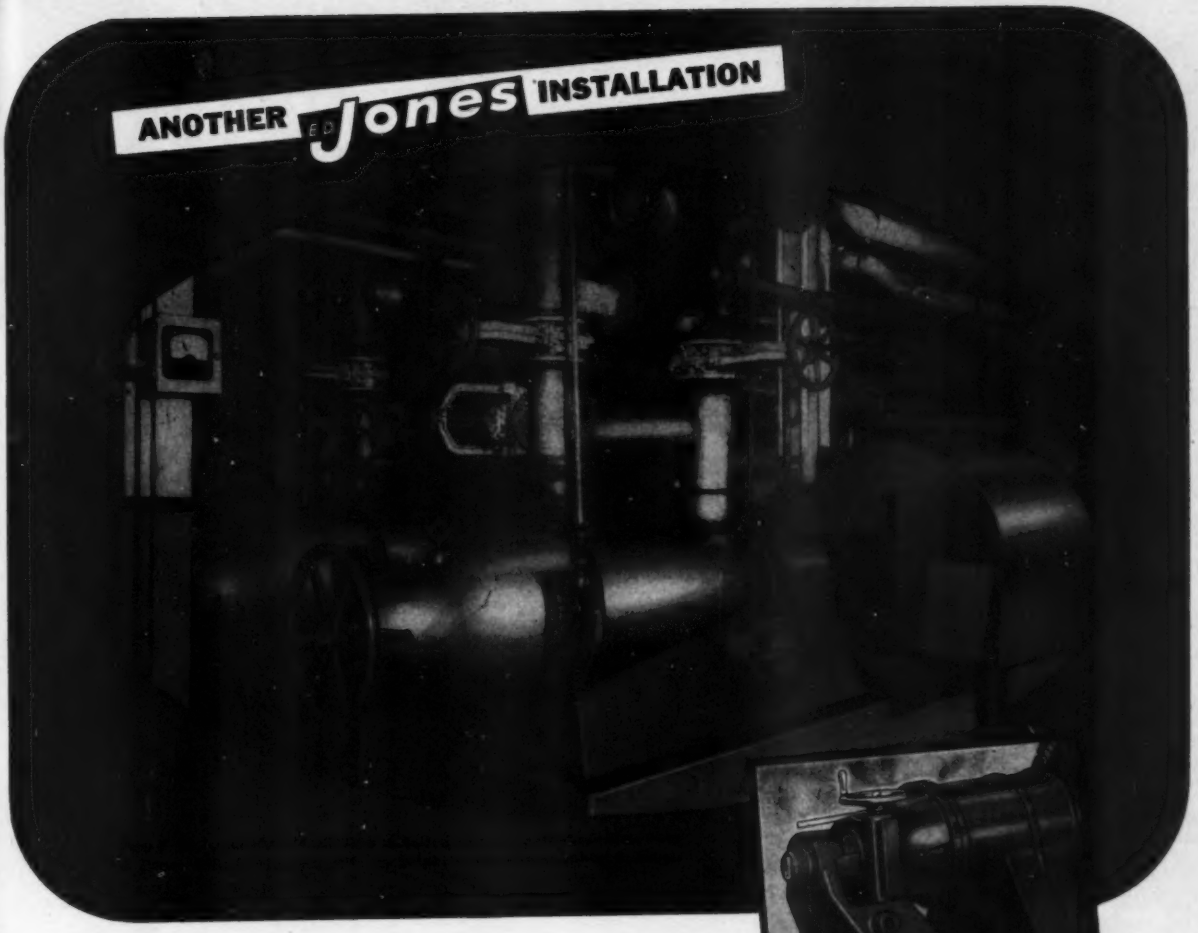
The soundness of the Weyerhaeuser sustained yield programs depends on the ability of its foresters to predict with reasonable accuracy the yield of these young forests. Based on these future growth figures, the productive capacity of the Pulp Division can be planned years ahead. As the quantity of the crops from these young forests increases, so will the quantity of Weyerhaeuser Sulphite and Sulphate pulps.



WEYERHAEUSER

ANOTHER E.D. Jones INSTALLATION



30 tons per day per unit on screenings

That's the production of these two Fibremasters at Anglo-Canadian. Rugged machines for rugged work. Power usage only 160 HP per unit. Freeness drop from 750 cc to 500 cc (CSF).

The Fibremaster, though it requires relatively small floor space, has twice the capacity of the well-known Jones High-Speed Refiner — without sacrificing any of the features that have made the smaller machine so popular.

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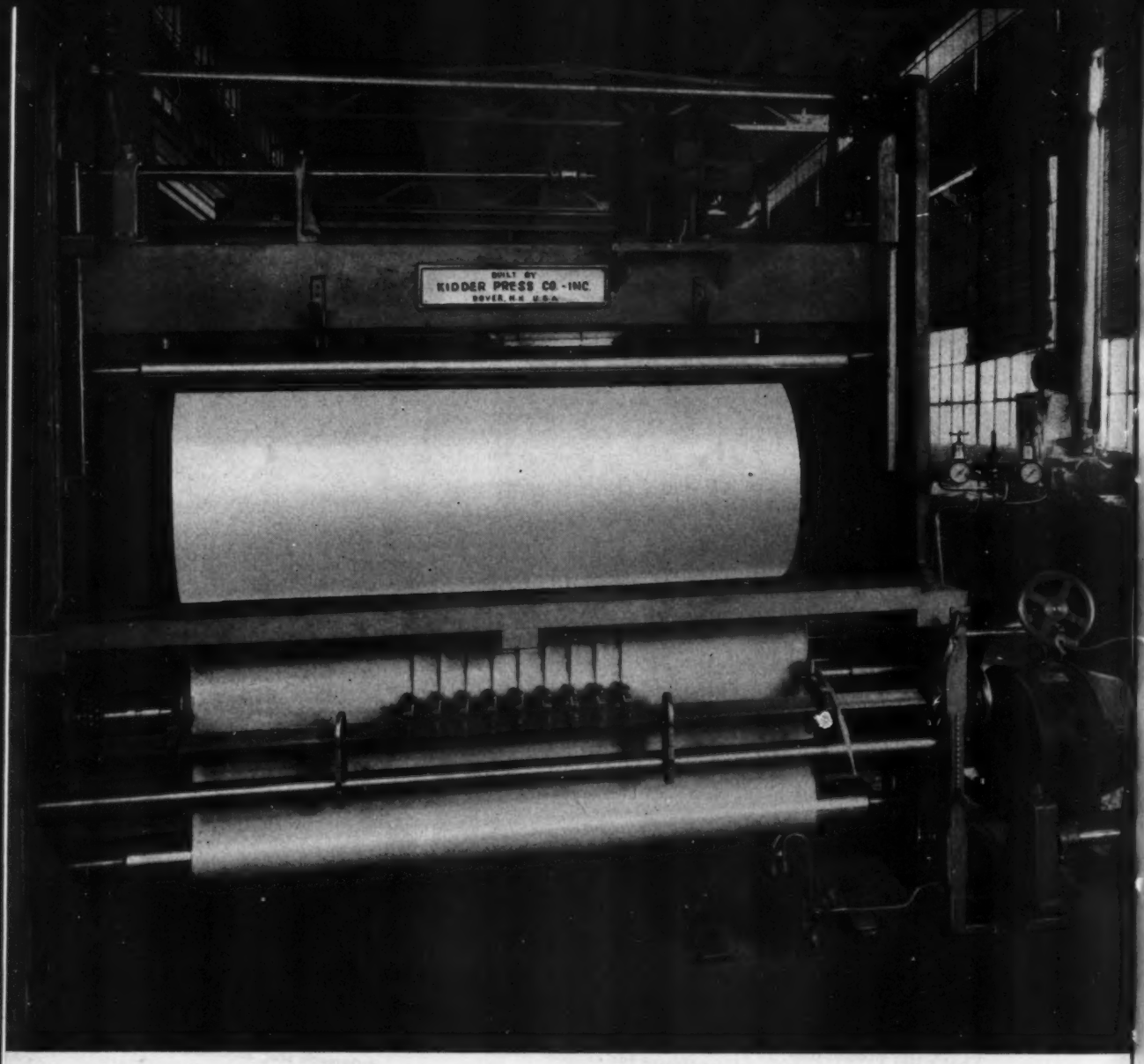

No Other Slitter offers you the cost-cutting, gearless construction of the Kidder Model G. T. Many other advancements make it ideal for handling stock ranging from 200 pound tag to the lightest tissue.

When you're measuring slitting-accuracy in thousandths...

nothing can equal Kidder shear cutting. On this Kidder Model G. T. Slitter, for example, the back cutters controlling the width of cut cannot move, and the front cutters are self-sharpening. This advanced shear-cut method — standard on all Kidder Slitters — assures maximum accuracy, long service life, dust-free slitting and positive roll separation.

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3 POINT SLITTERS

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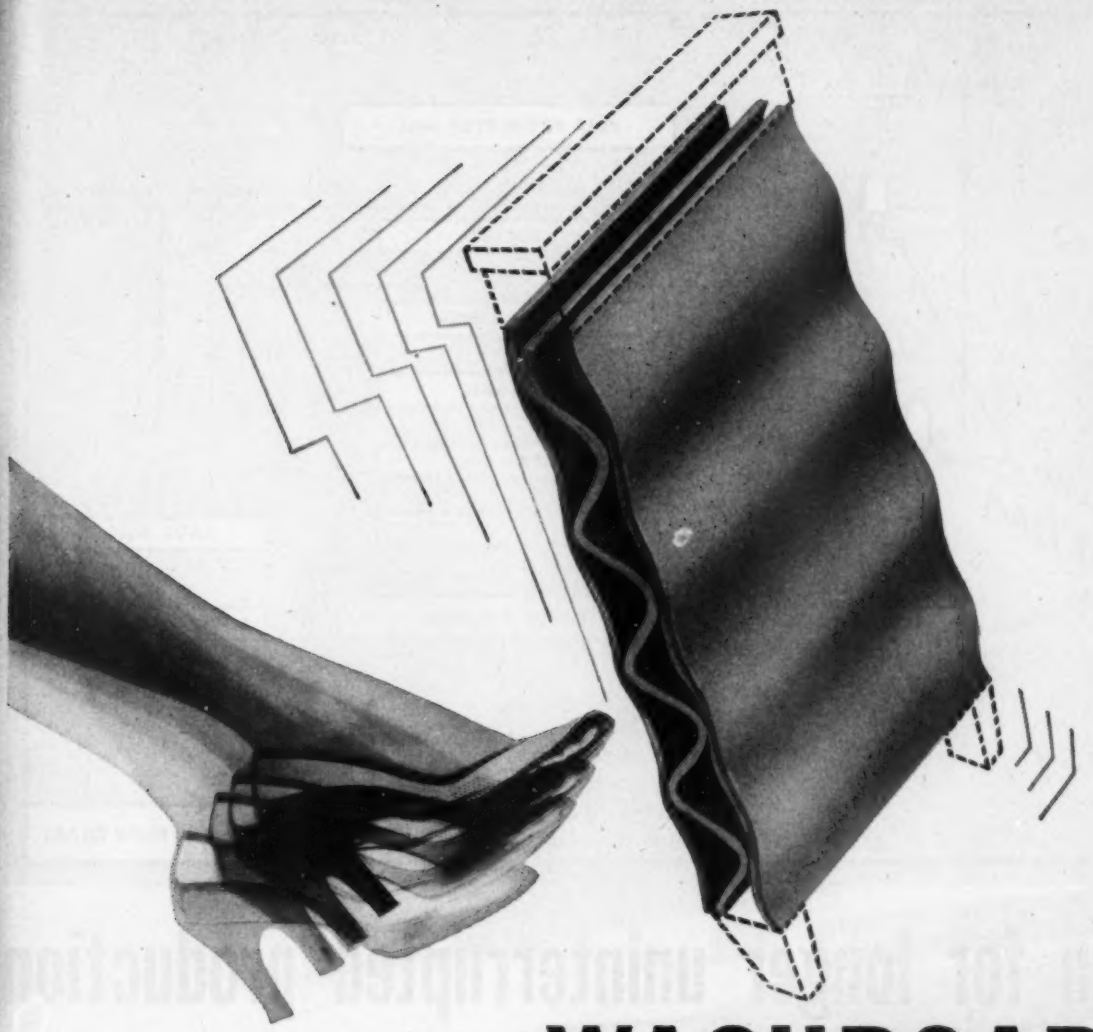
Dust-Free Cutting • Easy Roll Separation



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by control of moisture and adhesive penetration

with **KELSIZE®**

Washboard formation in corrugated board is caused by excessive moisture being absorbed by the liner after it has been bonded to the flutes. This condition can be improved by reducing the excess moisture at the glue line through the use of a small percentage of KELSIZE which will insure uniform adhesive application, control of adhesive penetration, and uniform viscosity.

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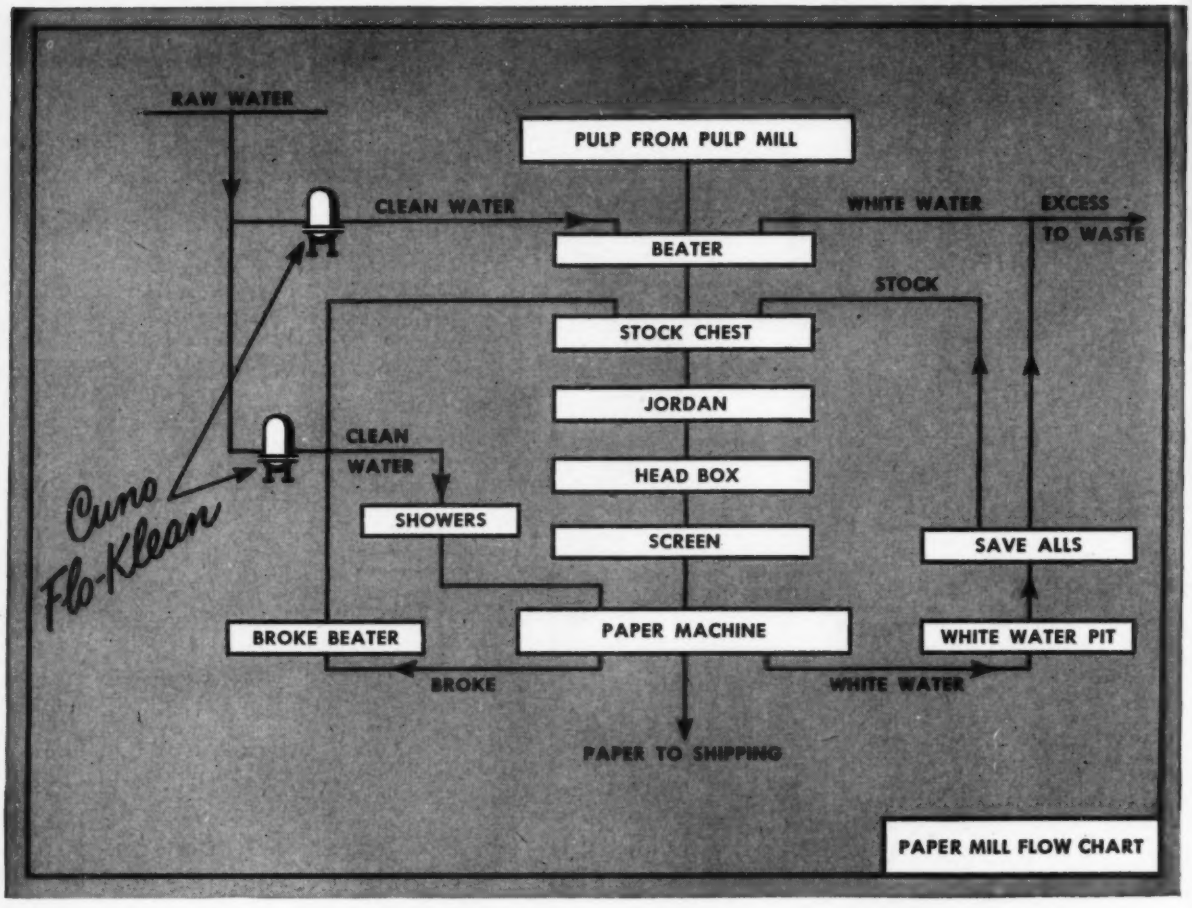

Plan for longer uninterrupted production

When paper and pulp mills have clogged showers or damaged wet felts and Fourdrinier wires, it takes time and money to get going again.

Paper and pulp men have learned from experience that they can avoid costly down-time by installing Cuno FLO-KLEAN filters in their water systems. FLO-KLEAN filters remove harmful solids from river, lake or well water before equipment can be damaged.

You can install a FLO-KLEAN and forget about down-time caused by dirty water. Automatic and continuously self-cleaning, FLO-KLEAN filters are available to handle between 200 and 100,000 gallons of water per minute—with no interruption of flow, and no loss of backwash water. Pressure loss is negligible in this corrosion- and abrasion-resistant unit.

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value in a fine product

reflects the experience and skills of its makers.

value in Fourdrinier wires is a matter of record ... paper quality and production records in mills throughout America reflect the fact that Appleton Wires are Good Wires!

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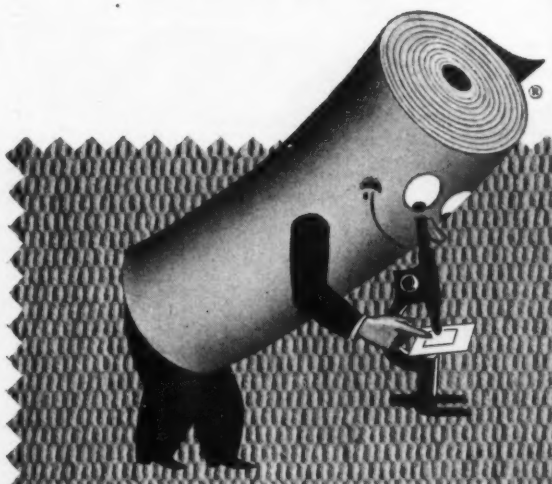
SCIENTIFIC CONSTRUCTION*

Makes The Big Difference In DRYER FELTS



WOODBERRY 887 REINFORCED DRYER FELT

Gives You Scientific Construction

Checking evenness of roving with Belger Tester. One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products.

*Asbestos yarns woven into the face of patented Woodberry 887 dryer felts at scientifically determined intervals give you longer wear and smoother operation. Paper mills have learned to count on lowered steam consumption and consistent quality with Woodberry 887. For dryer felts that are low on cost, high on performance, specify Woodberry 887.

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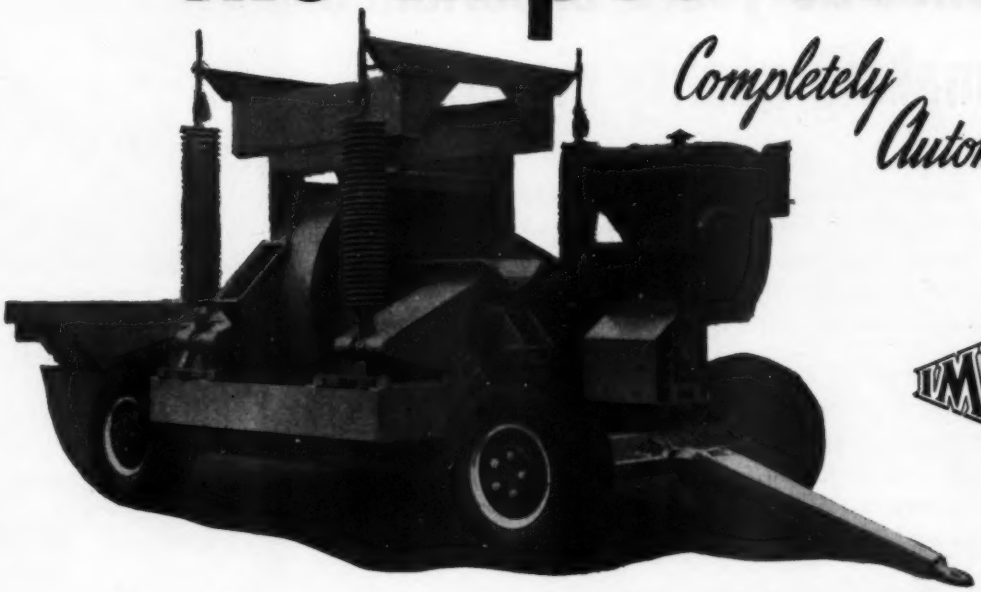

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Easily handles irregular shaped logs!

The Impco Barker has been developed to meet today's high bark removal requirements combined with low wood loss.

It is available as a stationary unit for general wood yard barking or as a portable unit mounted on a heavy frame equipped with tires for highway towing. The mobile unit can be furnished with a self-propelling drive for moves between barking sites.

Capacities up to 20 cords per hour depending on conditions, size and type of wood can be expected.

Specifications:

Wood size —
4' to 8' in length, 4" to 18" in diameter
Feed Rate —
30 to 120 f.p.m.
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Automatic self-centering self-sizing
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F 1-a

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If you are not already profiting from Du Pont's long experience with pigments, now is the time to talk with your Du Pont representative. He will be glad to show you how Du Pont's new direct service can help you with your pigmenting problems. E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

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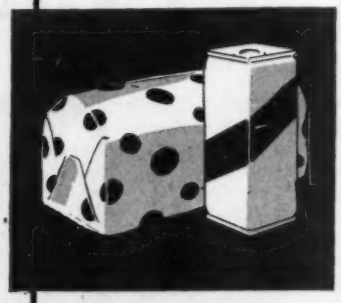

FOR WHITENESS

"Ti-Pure" gives your paper a whiteness—that lasts! Ideal for a variety of food wrappers and containers, particularly waxed bread wraps and waxed boards.

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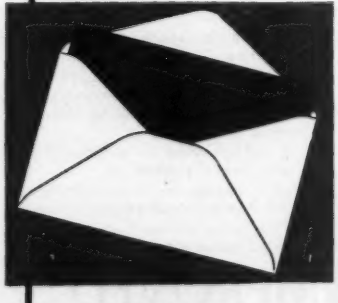
"Ti-Pure" permits sharper reproduction of printed matter. Both black-and-white and color work stand out better on book stock, stationery and magazine paper.



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"Ti-Pure" eliminates show-through—especially important in lighter-weight papers for envelope stock, stationery and waxed board. Saves user money on mailing costs.

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108th year

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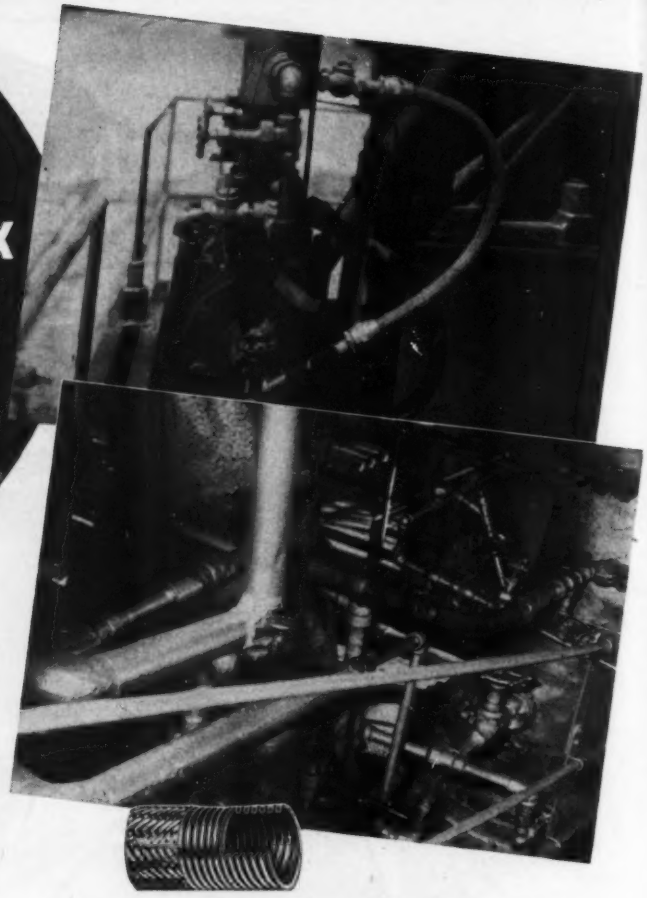
INDUSTRIAL REX-FLEX
Heavy Wall
Stainless Steel
HOSE



Available in four types to meet every industrial need

TYPE RF-44—Annularly corrugated; sizes from 2½" through 6" I.D. for working pressures to 40 psi.

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A complete range of flanged or screwed fittings may be used, attachment being made by silver brazing or atomic hydrogen welding.

See your industrial distributor, or write for data sheets giving full specifications on Industrial REX-FLEX.

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- *Superheated steam*
- *Conveying corrosive gases and liquids*
- *High temperature connections*
- *Vibration connections*
- *Vacuum hose*
- *Fireproof connections*
- *Conduit*
- *Offset motions*
- *Continuous flexations*
- *Air ducts*
- *Exhaust connections, etc.*

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Industrial REX-FLEX is part of Flexonics' complete line of flexible metal hose. All types are described in Catalog 150-R. Or see the Flexonics' catalogs in Sweets, Chemical Engineering Catalog or Refinery Catalog.

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CHICAGO METAL HOSE DIVISION

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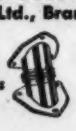
Flexon identifies products of Flexonics Corporation that have served industry for over 52 years.

Flexible metal hose

Expansion joints



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Metallic bellows

control FOAM all the way . . .

with the

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Wherever foam rears its costly head in pulp and paper processing, these specialized AHCO DEFOAMERS smack it down quickly and surely!

From the blow pit to the calender these AHCO DEFOAMERS do a complete job regardless of volume or speed factors.

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Promote more perfect sheet formation . . . keep foam and bubble formation under control *all the way!*

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HAM FELTZ says:

"Old Egypt's slaves were out of luck;
They had no straw; the wet bricks stuck
Before the sun could bake them dry
Beneath the redhot desert sky.

"Yes, they were up against it as truly as a modern manufacturer of paper or board would be without wool felts to keep his sheet from sticking.

"Only last week I saw a machine running board from the wet end to the heated dryers without passing through a number of presses. He could not have operated without wool felts.

"Most mill superintendents seem to *prefer* Hamilton Felts. They tell me that Hamilton Felts, with large open spaces between threads, remove more water and their thick, soft nap filters out all loose fibers and give finer finish to their sheets.

"You will never get stuck with Hamilton Felts."

From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

Hamilton Felts

MIAMI WOOLEN MILLS

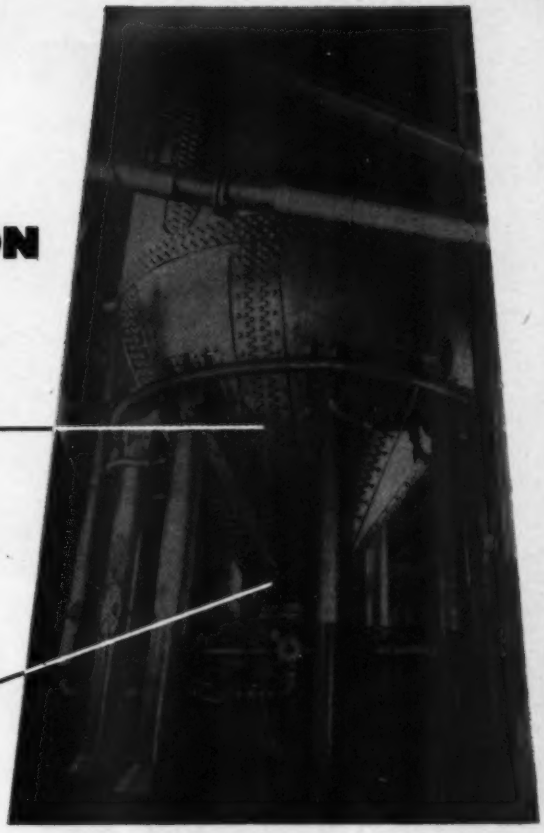
Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO

MORE PULP
PURER PULP
...LOWER COSTS PER TON

with

AMMONIUM Bisulfite Pulping



• **More pulp**—a higher proportion of acceptable pulp of increased freeness is produced, thus increasing the capacity of knotters, deckers, washers and fine screen equipment.

And here are some additional reasons why leading mills have converted to the high-production, low-cost Ammonium Bisulfite Pulping process using Barrett® Brand Anhydrous Ammonia:

• **Better quality**—unbleached pulp is more uniform, stronger, brighter; has lower ash and lower screened speck count. Less bleach needed.

• **Saves steam**—superior penetration reduces cooking time and maximum temperatures. Temperatures are lowered as much as 30°F!

• **Saves labor**—one ton of ammonia replaces *three* tons of limestone. Handling of limestone, scaling is eliminated.

• **Overcomes steam pollution**—waste liquor is *easily evaporated;* there is a greater recovery of heat and chemicals; while steam pollution is reduced to a minimum.

The changeover to this Pulping Process—pioneered by us—is inexpensive. A minimum replacement—and in many cases no replacement—of equipment is involved, and there is practically no loss of production during conversion.

Why not wire, phone or write us today? A member of our Technical Service staff will call, give you full details, facts and conversion methods. No obligation!

NITROGEN DIVISION ALLIED CHEMICAL

Anhydrous Ammonia

NITROGEN DIVISION

ALLIED CHEMICAL & DYE CORPORATION
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Ethylene Glycol • Diethylene Glycol • Triethylene Glycol • Methanol • Formaldehyde • Nitrogen Tetroxide • U.F. Concentrate—85 • Nitrogen Solutions • Fertilizers & Feed Supplements

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☐ Yes, please send me full details on your Ammonium Bisulfite Pulping Process.

☐ Please arrange to have your Technical Service Man call! No obligation.

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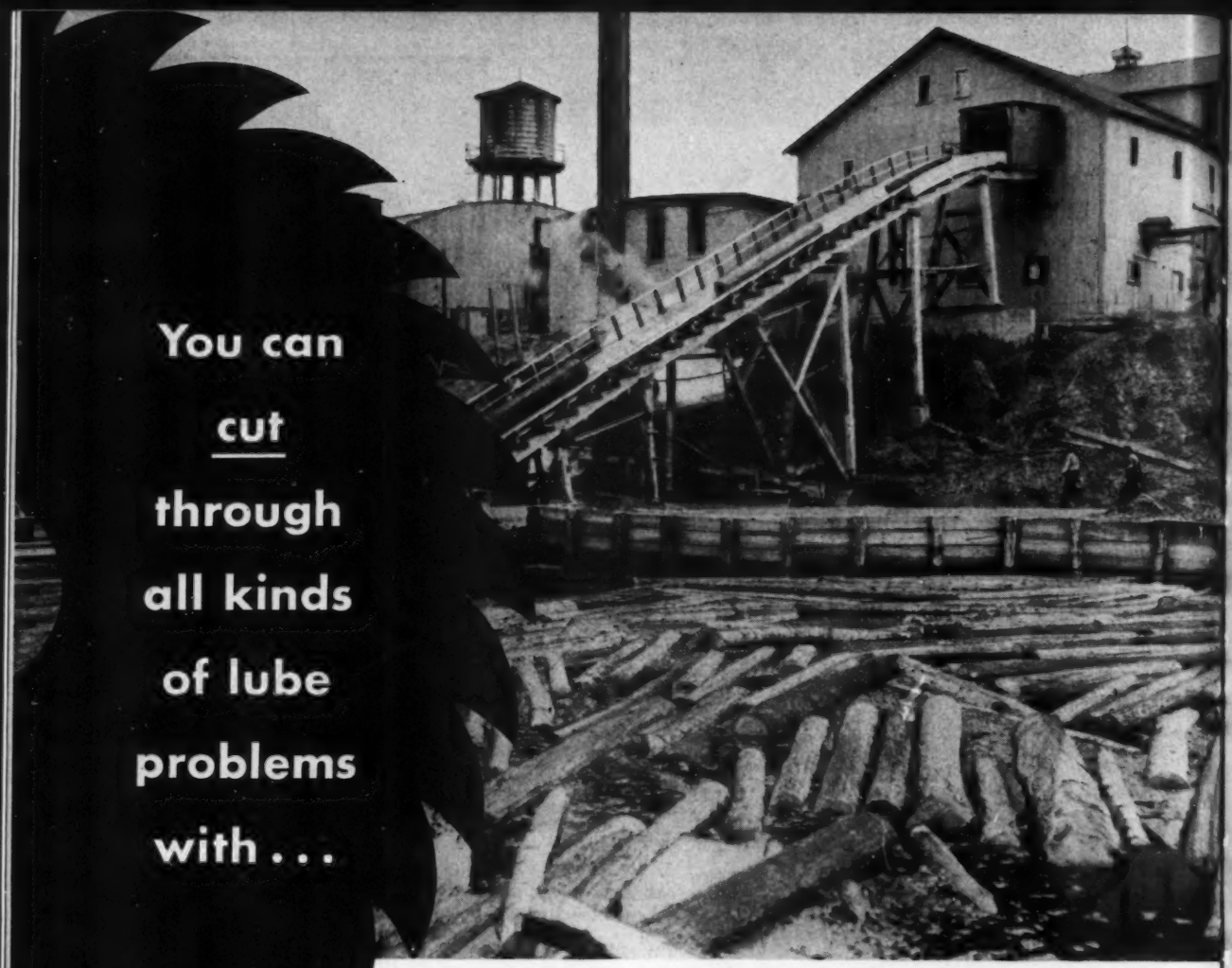


You can cut through all kinds of lube problems with . . .

STANODRIP Dripless Oils

STANODRIP Dripless Oils are particularly suited for use in processing industries (food, rubber, etc.) where possible contamination from oil poses a lubricating problem. If your plant is in the Midwest, there's a trained Standard Oil lubrication specialist nearby who can be of service to you.

● This story about a sawmill describes a problem that is common to many industrial plants. And it tells about a service that solves a thousand and one different problems in the operation of industrial machines.

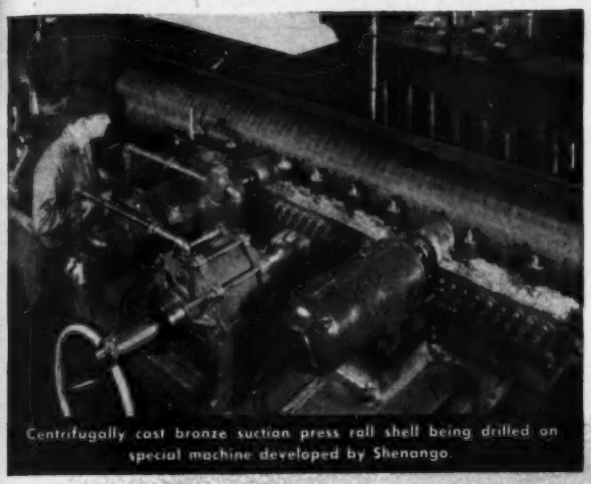
The sawmill pictured above was having trouble with overheated bearings, as well as with high consumption of oil on these particular bearings. In addition, there was excessive dripping of the oil on the floor, creating a safety hazard.

The mill operators asked for the services of the near-at-hand Standard Oil lubrication specialist, C. F. Klenner. He recommended a trial of STANODRIP Oil No. 99, an oil having remarkable dripless qualities and at the same time capable of withstanding high heat.

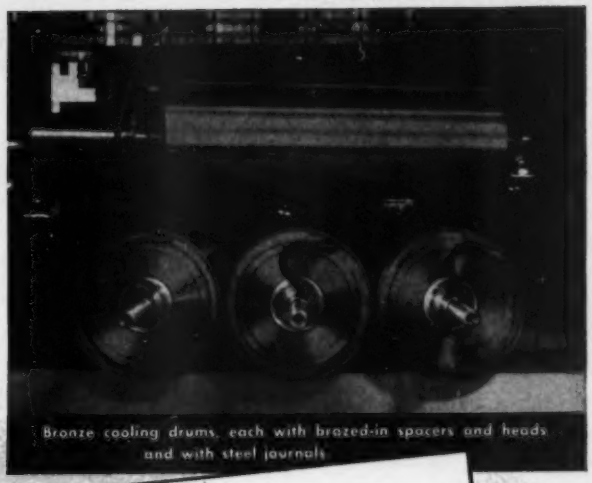
After a reasonable trial period, inspection revealed that consumption was greatly reduced, bearing temperatures were considerably lower and there were no more oil puddles on the floor. STANODRIP Oil No. 99 was then placed in all line shaft bearings and since then, there have been no bearing failures.

STANODRIP Dripless Oils are part of a complete line of Standard lubricants developed to serve the many machinery lubricating problems of industry. If you want help or information, phone your nearest Standard Oil office or write: Standard Oil (Indiana), 910 S. Michigan Avenue, Chicago 80, Ill.

STANDARD OIL COMPANY STANDARD *(Indiana)*



Centrifugally cast bronze suction press roll shell being drilled on special machine developed by Shenango.



Bronze cooling drums, each with brazed-in spacers and heads and with steel journals.

Shenango Qualities mean longer roll life

SHENANGO-made rolls, simple or complex, large or small, have one important thing in common. They are cast by the Shenango highly advanced centrifugal process. This means stronger, pressure-dense metal with finer grain... better able to withstand friction as well as pressure and heat stresses.

This, together with Shenango's modern machining and finishing facilities, adds up to superior, money-saving performance for rolls, roll cores, drums and assemblies made precisely to your specifications.

It will pay you to specify Shenango. For further information or data on meeting your specific needs, write to: Shenango-Penn Mold Company, Centrifugal Castings Division, Dover, Ohio (Executive Offices: Pittsburgh, Pa.).

SHENANGO

ALL RED BRONZES • MANGANESE BRONZES • ALUMINUM BRONZES
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Stretch beam rolls (for Fourdrinier wire cloth) produced by Shenango in centrifugally cast Meehanite Metal.

Bronze breast roll with steel inserts, centrifugally cast, finished and assembled in the modern Shenango shops.

You can get more paper from this tree . . .

Armour glue and the Sveen system assure maximum retention of fine fibers, fillers and pigments

The Sveen process uses chemically modified glue solutions added to the stock to increase retention of fine fibers and fillers. Another advantage is a possible 50% reduction in the remaining solids in the white water, so this system reduces the separation required of mechanical save-alls or sedimentation-type recovery systems. For these reasons, and the economies they represent, the Sveen system is becoming increasingly popular.

Armour offers two outstanding glues for this application. BC high jelly strength Special Hide Glue is an accepted standard for the process. And Armour CX Special Bone Glue is a medium jelly strength dry glue, lower in price. Both are outstanding colloidal flocculents, and the choice between them should depend on local conditions. Our Technical Sales Service Department will gladly work with you to determine the most efficient, economical glue for your operation.

These are only two of Armour's adhesives for the paper industry. Our clear chrome hide glue is extensively used for surface or tub sizing of rag bond paper. We have other glues for "on machine" creping directly from the Yankee Dryer that supply the tacking properties necessary for softness in paper tissues. Write Armour today for complete information, including prices, on this line of glues for paper making.

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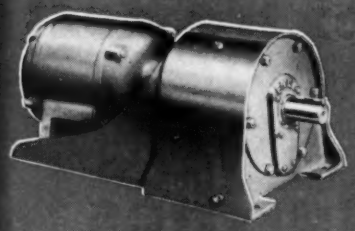
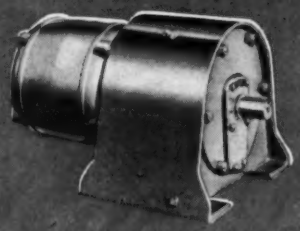
ALL-STEEL FALK Motoreducers

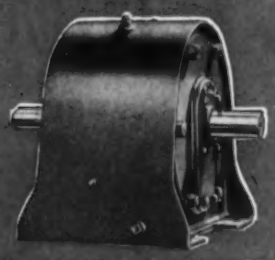
cover the entire application range



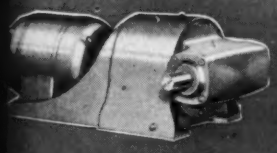
Type SZ, All-Motor Horizontal Motoreducer. Accommodates any make or type of foot-mounted motor.



Type IZ, Integral Horizontal Motoreducer. Standard NEMA D-flange motor mounts directly on Motoreducer housing.

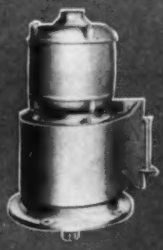


Type EC, Concentric Shaft Speed Reducer. Coupling, chain or belt drives.



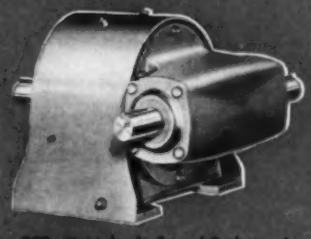
Type SBZ, All-Motor Right Angle Motoreducer. Any output shaft position (see below, right).

Type IBF, Integral Right Angle Motoreducer. Employs NEMA D-flange motor.



Type IFX, Integral Vertical Motoreducer. Employs NEMA D-flange motor.

Type IZX, All-Motor Concentric Motoreducer. For vertical applications.



Type ECB, Right Angle Speed Reducer. Any output shaft position; coupling, chain or belt driven.

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The name FALK on a reducing unit of any size or type is your positive guarantee of highest quality, value and efficient performance with minimum maintenance throughout its long life.

All-steel FALK Motoreducers—both the All-Motor and Integral types—are available in horizontal and vertical models with double, triple or quadruple reduction; concentric and right-angle shaft arrangements. They cover a surprisingly wide range in horsepowers and in output speeds. Every FALK Motoreducer is built and rated according to AGMA standards.

Whatever your reduction requirements—be they simple, complex or "different"— it is just good business to consult FALK, recognized leader in the Motoreducer and speed reducer field. Write to Department 247.

Every FALK Motoreducer has these "IN-BUILT" Factors

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Precision Gearing. Heat-treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

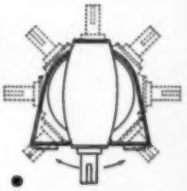
Sealed Housings. Dual closures and one-way vents keep oil in, dust and moisture out. Units are splashproof, leakproof, dustproof.

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

Any Output Shaft Arrangement (on Right Angle models). Shafts can be furnished in horizontal, vertical or angle position as shown in sketch at right.



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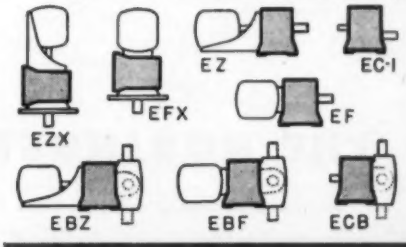
EC

The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.



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For three quarters of a century, B&W has been directly concerned with developing and applying boiler tubes for all pressures up to those approaching 3000 psi. The application of this extensive knowledge and experience results, naturally, in the production of finer welded boiler tubes.

For ease of fabrication and long service life specify B&W ERW Boiler Tubes for the tubing in your boilers.

LOOK FOR THIS

—wherever fine boilers are operating efficiently over extended periods.

To meet the specifications of time; say B&W before you say WELDED BOILER TUBES— for service-proved dependability.

B&W SEAMLESS and WELDED TUBES

TA-4026 (CWP)

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TUBULAR PRODUCTS DIVISION

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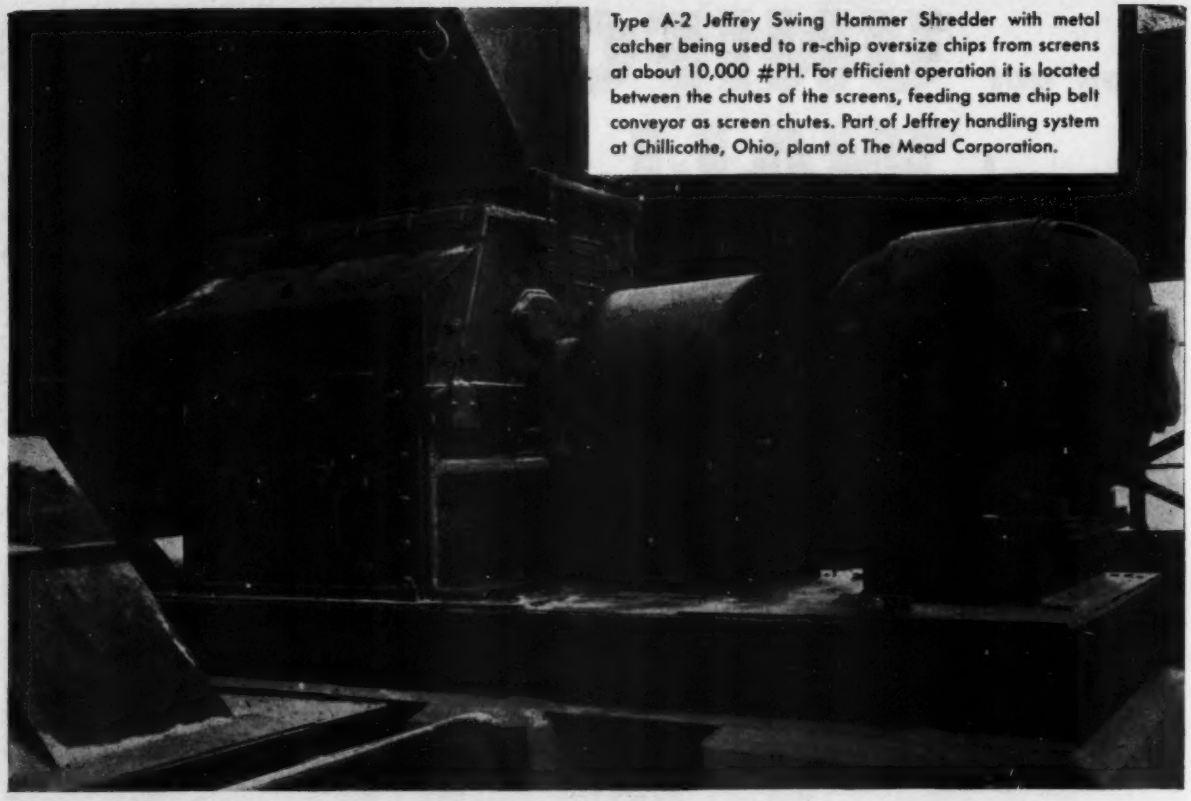
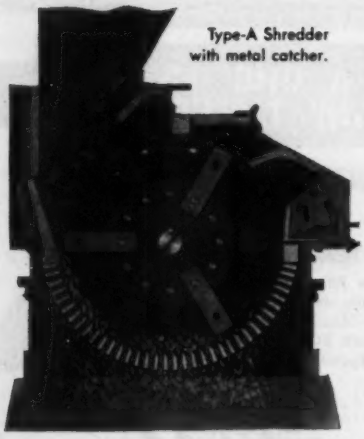
Alliance, Ohio—Welded Carbon Steel Tubing



Type A-2 Jeffrey Swing Hammer Shredder with metal catcher being used to re-chip oversize chips from screens at about 10,000 #PH. For efficient operation it is located between the chutes of the screens, feeding same chip belt conveyor as screen chutes. Part of Jeffrey handling system at Chillicothe, Ohio, plant of The Mead Corporation.

JEFFREY swing hammer shredders aid production at The Mead Corporation



Type-A Shredder with metal catcher.

Jeffrey Swing Hammer Shredders are widely used in paper mills for most efficient production. Our range of types and sizes permits engineers to select the ideal unit according to feed, speed and size of product desired.

A typical use of Jeffrey Shredders is reduction of oversize bark and broken logs from the barking drums to make a uniform fuel. Jeffrey Shredders also take oversize chips from the screens and reduce them for the cookers. They do an excellent job of semi-refining partially-cooked screenings and oversize material from the knotters. They reduce salt cake with fine results.

Rigid Hammer Shredders for pulp, broke or Kraft sheets complete the Jeffrey line for the paper industry.

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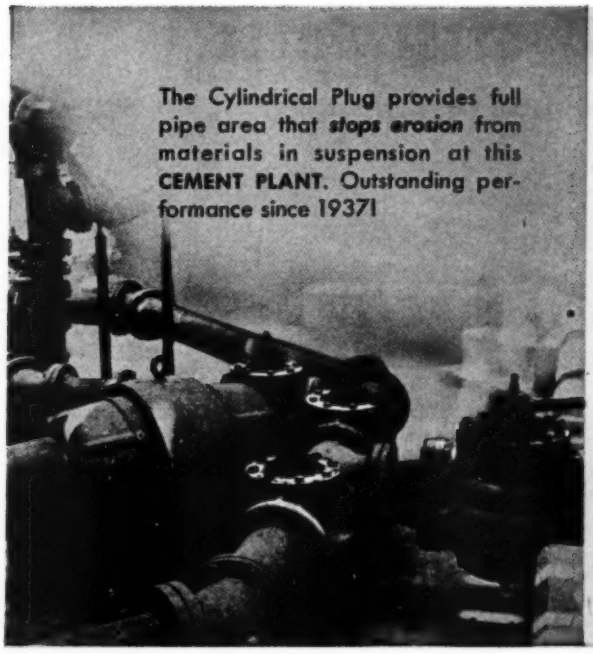
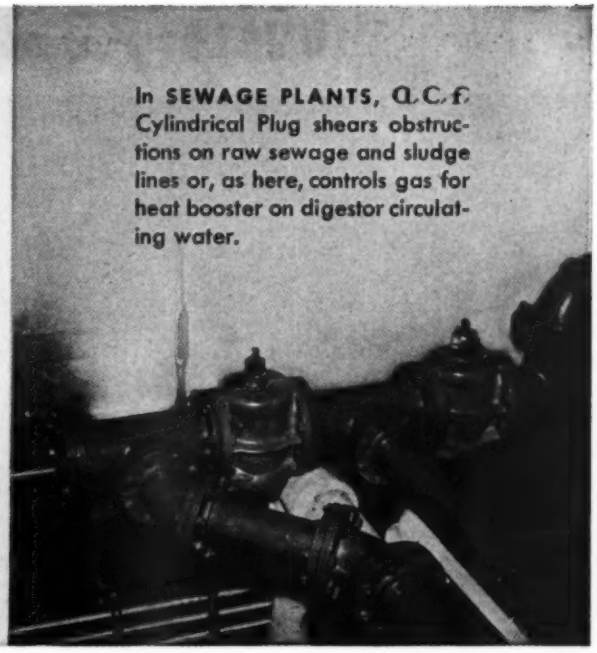
IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!



The Cylindrical Plug provides full pipe area that ***stops erosion*** from materials in suspension at this **CEMENT PLANT.** Outstanding performance since 1937!



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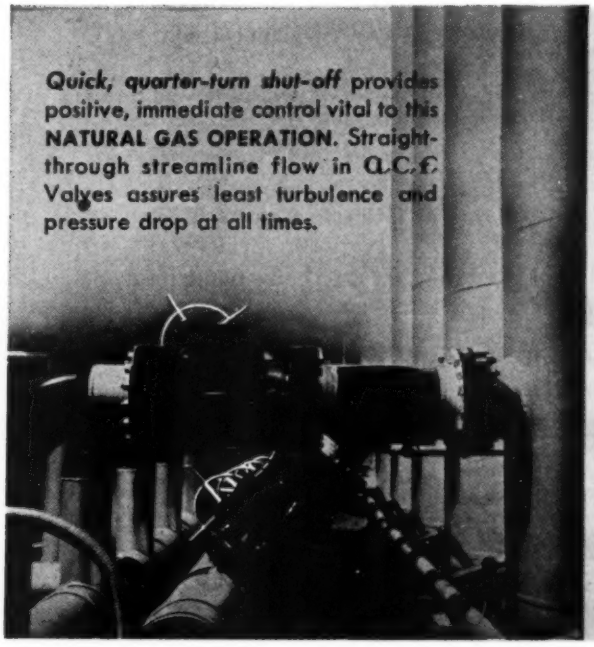

Quick, quarter-turn shut-off provides positive, immediate control vital to this **NATURAL GAS OPERATION.** Straight-through streamline flow in a.c.f. Valves assures least turbulence and pressure drop at all times.

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DO YOU KNOW that Midvale has scores of years of experience and "know-how" in making fine calender rolls?

DO YOU KNOW about the savings you can realize with Midvale Stainless Steel water-box rolls?

Why not consult us about your calender roll problems? Send for descriptive folder on hardened and ground paper mill rolls.

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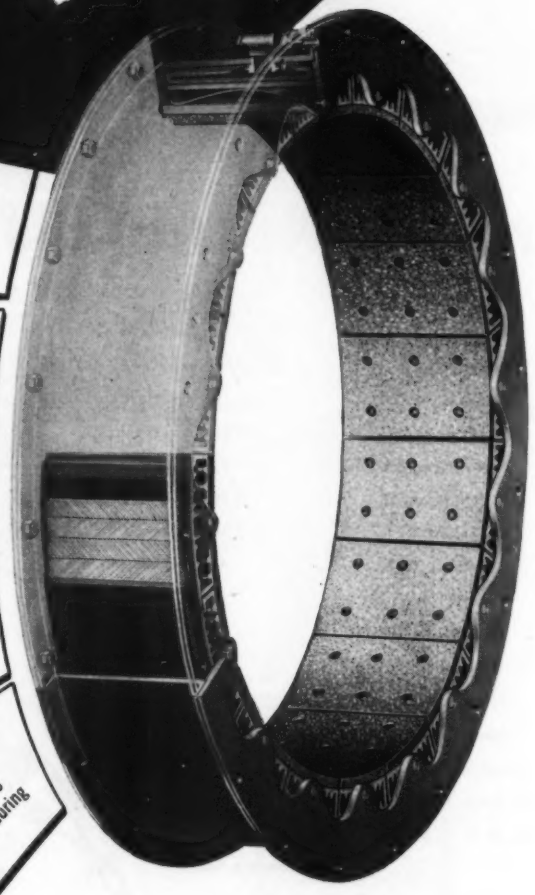

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* **Replaceable tube**—loose, expanding operating tube can be replaced without removing clutch from shaft.

* **Replaceable lining**—friction lining is riveted to ventilated backing plates for easy simplified field replacement.

* **Rigid construction**—rugged constricting clutch provides for transmission of power from the friction shoes through the torque bars to the side plates of the assembly.

* **Low contact velocity**—reduced drum diameter assures low contact velocities and less generated heat at high-operating speeds. No high-point loading because of even contact velocity all around the drum.

* **Complete Disengagement**—the friction surface is completely separated from the drum when disengaged. No internal parts to drag during idling periods.

* Investigate the advantages of FAWICK TYPE VC Air-Ring CLUTCHES for the heavy-duty applications on your equipment.

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The Paper Industry

April 1954

Defense against recession

The Committee for Economic Development's 54-page report, released on March 22, explains the national policy on measures to be taken that will prevent a major business recession.

The report is highly informative and reflects a confidence which we should like to see adopted by that segment of American as well as foreign business and industry that is inclined toward a less constructive outlook. The report lifts the veil of mystery that shrouds much of the popular concept of a recession. It permits us to look at the causes of a recession with a more objective and intelligent appraisal. What we do see is infinitely less menacing than the pessimistic picture that is in the minds of those who interpret business activity in terms of 1930 concepts.

The report, of course, accepts the realism of "ups and downs" in the American economy, but it points out the "vast difference that exists between moderate and inevitable ups and downs and the great general swings we have sometimes experienced."

The prevention of a major recession, of course, will not just happen. The measures suggested in the report must be implemented in a spirit of cooperation and within the scope of an efficient, dynamic, and free economy. The measures place a premium on the initiative, insight, judgment, and boldness each individual business or industrial concern is capable of mustering while playing its full part in a competitive free economy.

Part I of the report deals with processes — private and governmental — that should be in operation at all times to keep the demand for goods and services growing.

Part II lists and explains features of our economy — business policy and government programs — that automatically tend to resist economic decline at the first symptoms.

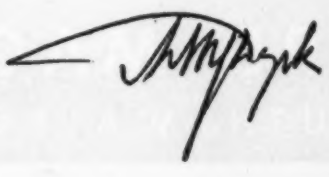
Part III deals with deliberate actions to be taken by government when an economic decline is under way or when it can be clearly identified. This involves the expansion of public works or the reduction of taxes.

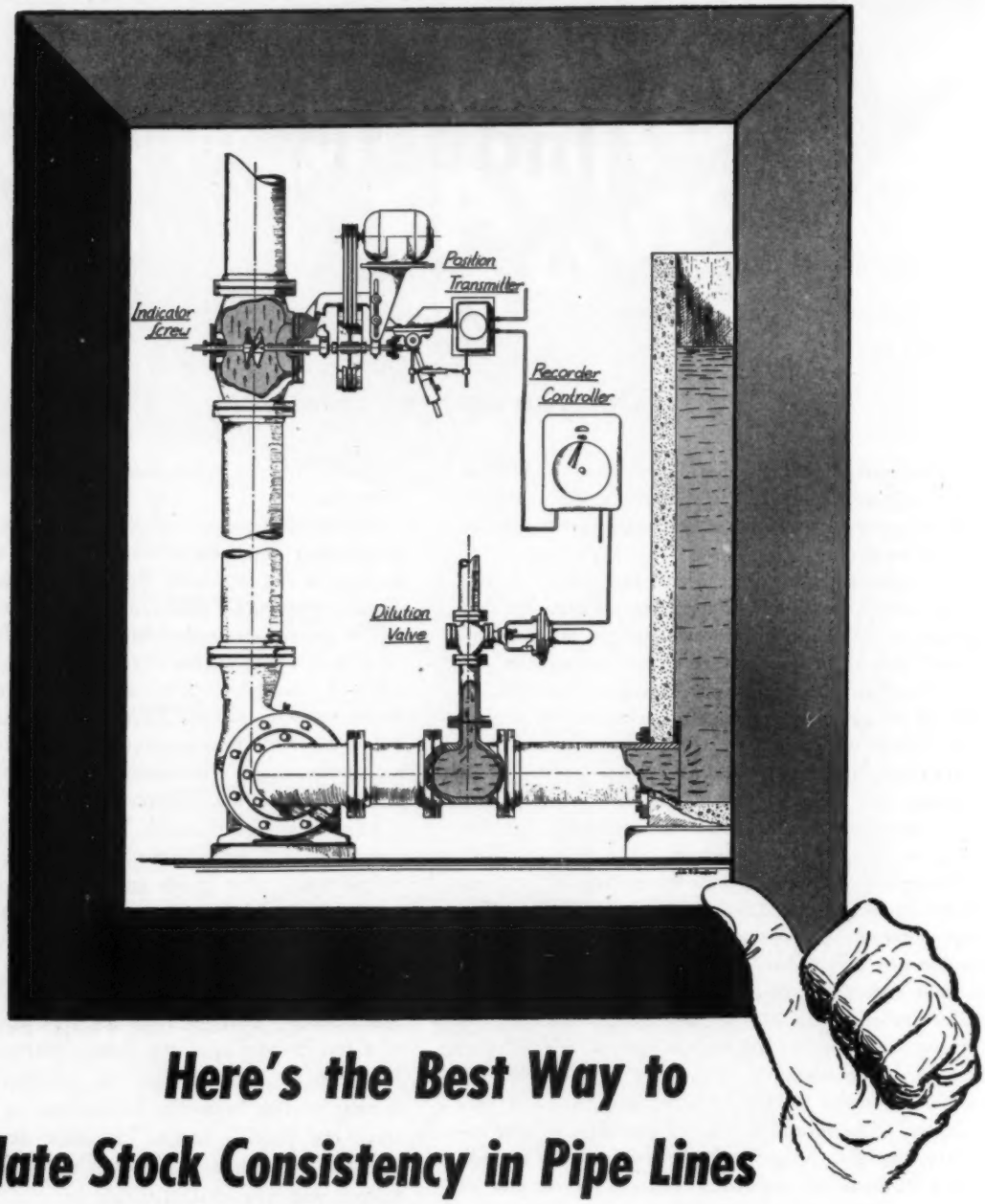
The provisions under Part I are undoubtedly the most challenging. They involve research, the development of new products to satisfy new wants, creating better value in already established products, applying improved production methods to reduce costs, developing more stable inventory and capital investment policies, and selling constructively.

Advertising must receive renewed attention. Effective ways and presentations must be devised to let people know what goods and services are available to satisfy their wants. There can be little demand for new products or services unless people are informed of their existence and acquainted with their advantages.

Selling constructively involves an approach that is fundamentally different from the high pressure methods of a few decades ago. Its main requirement is market research. It must develop an informed sales force. It must provide consumer information on products that serve the public's wants. It must devise improved distribution methods both from the standpoint of efficiency and cost of distribution.

We strongly believe that, if business and industry intelligently and resourcefully apply the measures outlined under Part I of the report, the national psychology will take the desired direction as to create a business environment where the need will seldom arise for the auxilliary or safety measures provided under Parts II and III.





Here's the Best Way to Regulate Stock Consistency in Pipe Lines

The Bird Consistency Regulator provides precise dependable control of stock consistency.

The sketch shows how it's done when stocks are of relatively high consistency. Pneumatic recording control is shown. Bird Regulators are also equipped with mechanical control if desired. Either way you may be certain of uniformly accurate constantly reliable regulation.

For consistency control anywhere in the pulp or papermaking process, the Bird Regulator is your best bet.

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The Paper Industry Current Comment

Prophets of boom . . . a world gap . . . . . no disturbances . . . and taxes

Prophets of boom are beginning to displace the dispensers of gloom among the economic forecasters of business. All indications point to an improving business position, instead of the increased unemployment which was forecasted some weeks ago.

This was especially evidenced in a recent panel discussion of the nation's business by a group of outstanding economists at New York. Three appeared before a New York group of business analysts, and all three were optimistic. To avert a one-sided discussion, an added starter was called upon to express his well-known pessimistic views.

The attitude of optimism seems to be more and more in evidence. The securities markets are continuing strong and show no signs of the burst of buying enthusiasm which often precedes a sharp drop. And the market tone is usually a veritable barometer of future business, not a recorder of what has already happened.

Heroic efforts

A report to the United Nations by the group named to study world paper and printing states that efforts on an heroic scale will be necessary if the gap between demand and supply is to be bridged. An example is Singapore, which in 1935 had one newspaper with 5,000 circulation and now has 15, two of which alone have a circulation of 80,000. The study forecasts a 1960 world consumption of 50,000,000 tons of wood pulp as compared with the 1950 use of 32,000,000. The Food and Agriculture Organization of the United Nations, which made this report, announced that it has completed agreements with 14 countries for technical assistance projects focusing on study of local potentialities in paper and pulp production. These countries are Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Greece, Mexico, Peru, Turkey, Venezuela, the Philippines, Thailand and Yugoslavia.

The United States' part in United Nations can easily indicate that American funds may be called for to assist in financing various projects, as has already happened to a total of many millions.

The Japanese project to build a pulp mill in the Tongass National Forest in Alaska has taken a unique turn. Protests against the use of American public lands for a foreign investment project led to the dropping of the project. Instead, the United States State Department is said to have sponsored negotiations to supply the Japanese with Canadian pulp for their paper mills.

Pulled out of a hat

A foretaste of the battle that can be expected when and if the proposals for tarriff revision come before Congress as a result of the Randall Commission recommendations was seen when the Congressional Joint Economic Committee held its final session for consideration of the President's January economic report. Opinions of experts on the effect of tarriff rate reductions on American labor became so sharply expressed that they verged on verbal battles. Glen Saxon, a Yale professor who advocated a quick return to an international gold standard, was accused of talking "textbook theories" by a Brookings expert, William Adams Brown. Mr. Saxon angrily denied this charge and in turn charged CIO Steelworkers representative Elmer F. Cope and Howard Piquet of the Library of Congress of using figures "pulled out of a hat." Mr. Cope had said that if tarriffs were reduced 50 per cent, not more than 100,000 American workers would be affected. Dr. Piquet used a different figure, saying that not over 200,000 workers would be affected by increased imports if tarriffs were completely suspended.

Secretary Mitchell of the Department of Labor foresees no unusual labor disturbances this year. He has predicted that the big push would be for a guaranteed annual wage, but that American industry could not afford an increase in the minimum national wage to $1.25 per hour from the present 75 cents.

The big Washington story of the next few weeks will be the passage of revised tax legislation. A voluminous bill revising the entire tax code has been introduced in Congress, with the House Ways and Means Committee Republicans taking one view, the Democrats another, and the Administration forces definitely opposing some of the proposed recommendations. It would be futile to try to analyze the bill at this time, with all the changes that are certain to be made before it becomes law. Suffice it to say, campaign oratory will be spread over the pages of the *Congressional Record* for many a day to come.

Net incomes

Abitibi Power & Paper Co. Ltd.—Net income for 1953 was $10,044,152, as compared to $9,097,759 in 1952.

Allied Paper Mills—Net income for 1953 was $898,503, as compared with $860,779 in 1952.

American Writing Paper Corp.—Net income for 1953 was $579,743, as compared with $381,864 in 1952.

Bathurst Power & Paper Co. Ltd.—Net income for 1953 was $1,974,797, as against $1,825,895 in 1952.

Brown Co.—Consolidated net profit for the fiscal year ended November 30 was $3,050,696, as compared with 1952's $4,396,967.

Certain-Teed Products Corp.—Net income in 1953 was $3,940,943, as compared with $3,636,843 in 1952.

Chesapeake Corp. of Virginia—Net income for the 12 months ended December 27 was $2,446,499, as compared with $2,669,209 for the previous fiscal year.

Crown Zellerbach Corp.—Net income for nine months ended January 31 was $19,950,323, as against $16,020,965 in the comparable period a year before.

Eddy Paper Corp.—Net income in 1953 was $3,842,889, as compared with $3,529,151 in 1952.

Federal Paper Board Co.—Net 1953 income was $2,144,000, as compared with $2,397,058 a year ago.

Fraser Companies Ltd.—Net income for 1953 was $2,973,740, as compared to $3,455,575 in 1952.

West Virginia Pulp & Paper Co.—Net income for six months ended December 31 was $2,445,000, as compared with $2,584,000 in the same 1952 period.

Weyerhaeuser Timber Co.—1953 net income was $36,751,353, as compared to 1952's $36,706,578.

Dividend declarations

Abitibi Power & Paper Co. Ltd. has declared a 37½-cent preferred dividend and a 30-cent common dividend, both payable April 1.

Union Bag & Paper Corp. has voted a regular quarterly dividend of 75 cents on the capital stock, payable March 13.

Weyerhaeuser Timber Co. has voted a dividend of 62½ cents on the common, payable March 8.

Paper mill corporate changes

American Tissue Mills' Stony Brook Div. plant at South Hadley, Mass., has been sold to Marcalus Mfg. Co. of East Paterson, N. J.

Hinde & Dauch Paper Co. stockholders were given until April 1 to protest the removal of H&D common stock from listing on the New York Stock Exchange. The move was requested by the exchange, which asserted that all but 4962 shares held by 62 stockholders had been tendered in acceptance of an offer of West Virginia Pulp & Paper Co.

Monroe Paper Products Co. of Monroe, Mich., may not be sold to Waterbury Corrugated Container Corp. as planned. Stockholders, who prevented a previous plan to sell to National Container Corp., have begun another proxy fight to prevent the sale.

St. Regis Paper Co. stockholders have been asked to approve an increase in the number of authorized common shares from 7,495,714 to 10,000,000. The firm has no immediate plans for the issue of any of the additional shares but by such an issue will be placed in a position to issue from time to time such shares for the acquisition of additional properties or the securities of other companies.

Scott Paper Co. stockholders will be asked to authorize an increase from 5,000,000 to 10,000,000 shares and to increase the authorized indebtedness from the present $25,000,000 to $50,000,000.

Seaboard Container Corp. has been taken over by National Container Corp., the latter firm having acquired 97 per cent of the Seaboard stock.

Superior Paper Products Co. will become a unit of St. Regis Paper Co. if the move is approved by the SEC. St. Regis has registered 93,000 shares to be used to purchase control of the Pittsburgh firm as a subsidiary.

Do Your Wrapping and Labeling in ONE AUTOMATIC OPERATION — Save on Time and Labor Costs

THIS MACHINE DELIVERS TEN WRAPPED, SEALED AND LABELED REAM PACKAGES PER MINUTE.

Fully automatic REAM WRAPPER and LABELER MACHINE • Only one operator required • Handles sizes ranging from HEAVIER through 23 x 35, bulk 1" to 3". Adjustable to your specific requirements • Larger sizes on request.

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Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	March 10, 1954	Feb. 10, 1954
A.P.W.	3⅛	*2⅞-3⅛
Celotex	18⅜	18¾
Same Preferred	16¾	16¼
Certain-teed Prod	14⅞	14¾
Champion P & F	35½	35½
Same Preferred	*105½-131½	*103-104
Chesapeake Corp.	*28-28½	27½
Container Corp.	47	46
Same Preferred	*101¾-102	102½
Continental Diamond	11¼	12¼
Crown Zellerbach	41	39¼
Same Preferred	103¼	102
Dixie Cup	47	47
Eastern Corp.	*17-17⅜	*17¼-17⅜
Robert Gair	22⅝	21¼
Gaylord Container	26¼	26⅝
Great Northern P	59	60¾
Hammermill	14⅜	14⅜
International P	60⅜	60¾
Same Preferred	104¾	*104¾-106¾
Kimberly-Clark	52¾	51⅞
Same Preferred	111	109
MacAndrews & Forbes	44⅝	42
Marathon	20½	22
Masonite	18¾	17¾
Mead Corp.	31½	32
Same Preferred	*94½-95	*95-98½
National Container	11	11¼
Same Preferred	21⅝	22⅜
Rayonier Inc.	30⅝	29¼
Same Preferred	34½	*34¼-34⅝
Scott Paper	76	76¾
Same $3.40 Pref	94	93½
Same $4.00 Pref	*104½-105½	*102½-103½
St. Regis Paper	22¼	22⅜
Same Preferred	98	*90½-99
Sutherland Paper	37½	35¼
Same Preferred	130	125½
Union Bag & Paper	46⅜	45½
United B & C	*14⅞-15	15
United Wallpaper	1¼	1⅜
Same Preferred	16	*16¾-17⅜
U. S. Gypsum	125½	123¼
Same Preferred	178	*177¼-179
West V P & P	29¼	28⅞
Same Preferred	*108-109	108

New York Stock Exchange — Bonds

Celotex 3½%	..	..
Champion P & F Co. 3%	..	..
Mead Corp. 3%	..	..

American Stock Exchange — Stocks

American Writing	12	12¾
Brown Co. Common	10⅞	12
Same $5 Preferred	97½	101
Same $3 Preferred	51⅞	52
Puget Sound	33¾	33¾

*Closing Bid and Asked Prices.

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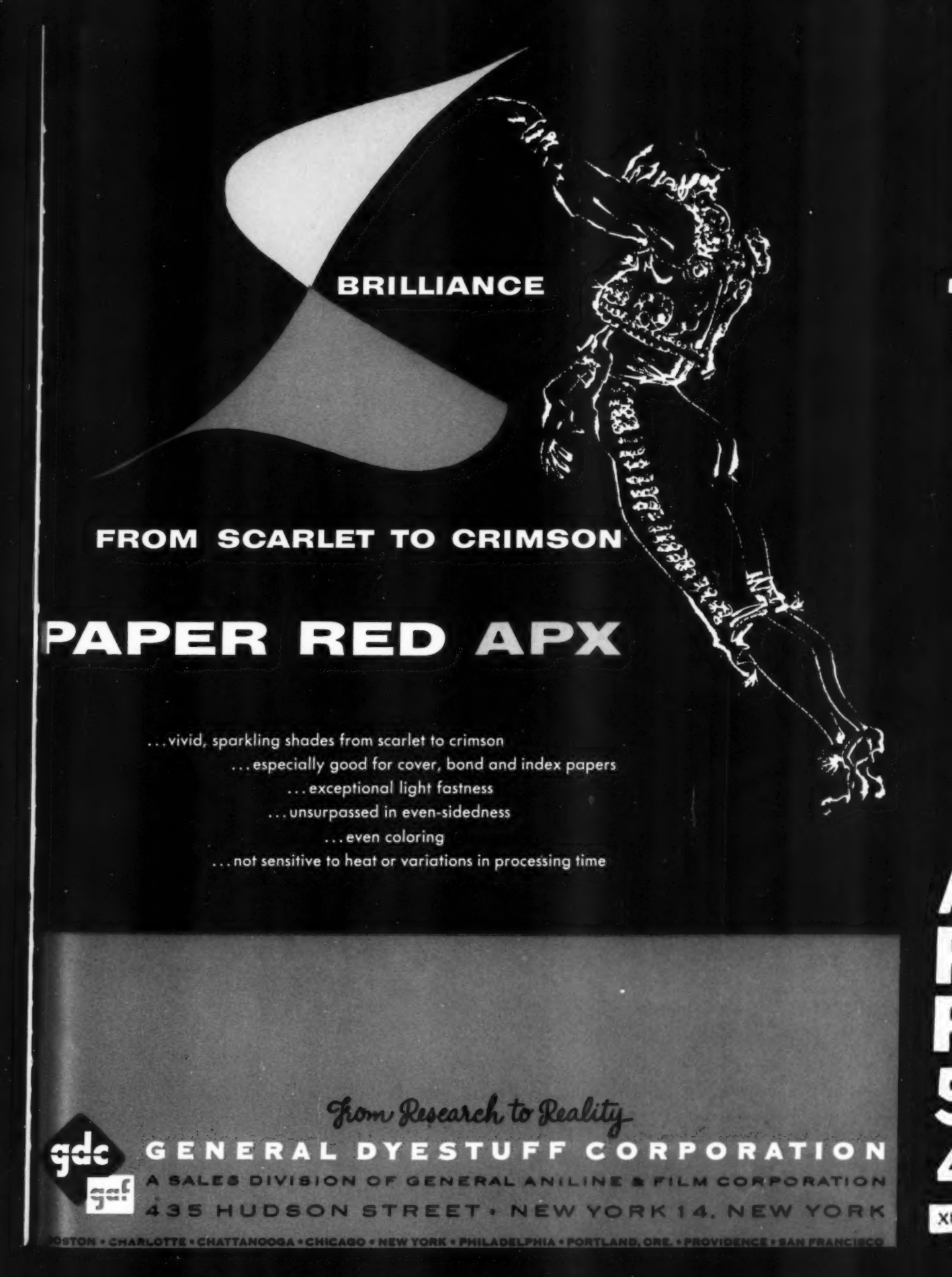
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Shown above is one of six, 12-ft. diam. by 45-ft. 4-in. sulphate digesters recently built by the Chicago Bridge & Iron Company for a southern paper mill. To make sure that these digesters would meet the highest on the job specifications, they were stress relieved, x-rayed and designed in accordance with paragraph U-68 of the ASME Code. This is the kind of construction and fabrication that guarantees service and dependability in your heavy equipment purchases.

These welded steel digesters are typical examples of the type of steel plate work that we regularly build in our shops. We also fabricate and erect chip tanks, pulp tanks, acid tanks, accumulators, blow tanks, elevated water tanks, settling tanks, diffusers and Marx Savealls for the pulp and paper industry.

Our four plants — at Birmingham, Chicago, Salt Lake City and Greenville, Pa., are strategically located to give pulp and paper mills efficient, reliable service.

Estimates or quotations on any Horton welded steel plate structure may be had by writing our nearest office. There is no obligation on your part.

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Chicago, 4.....2445 McCormick Building
Cleveland, 15.....2267 Midland Building
Detroit, 26.....1566 Lafayette Building
Houston, 2.....2143 C & I Life Building
Los Angeles, 17.....1559 General Petroleum Building
New York, 6.....3350—165 Broadway Building
Philadelphia, 3....1653—1700 Walnut Street Building
Pittsburgh, 19.....3231 Alcoa Building
Salt Lake City, 4.....527 West 17th South Street
San Francisco, 4.....1547—200 Bush Street
Seattle, 1.....1327 Henry Building
Tulsa, 3.....1651 Hunt Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.

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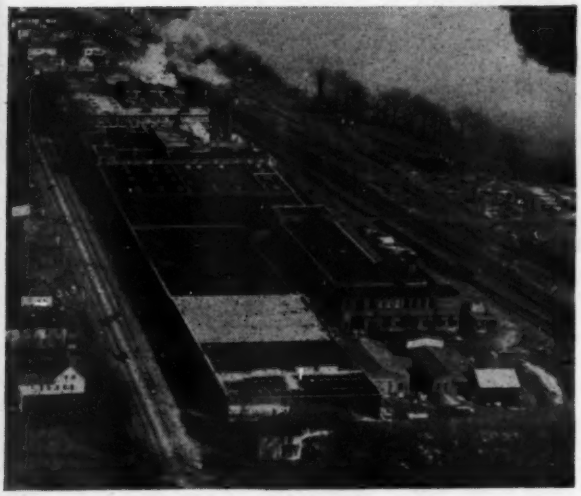

ABOVE: Recently completed plant of Keyes Fibre at Hammond, Ind.

LEFT: Waterville plant with Kennebec River at the right

RIGHT: Wallace E. Parsons, president of Keyes Fibre Co.

Pioneer of Molded Pulp Industry Celebrates Golden Anniversary

ONCE A STEP-CHILD of the paper industry, molded pulp production is now a vigorous 50 years of age and can rightfully claim a place as an important member of the paper family.

That's the view of Wallace E. Parsons, president of Keyes Fibre Co. of Waterville, Maine, and Hammond, Ind. Keyes is entering its 51st year of operation this year. "The industry has most of its growth ahead of it," Mr. Parsons declares. His firm produces approximately half of the country's total volume of molded pulp products and about 35 per cent of the combined output of the molded pulp and stamped paper plate business.

Two billion items a year

The industry had its beginnings about 50 years ago, when a young mechanic named Martin L. Keyes hit upon a way to form a plate out of pulp on a die. He secured some financial backing and constructed a small plant at Shawmut, Maine. Today, Keyes Fibre is a leader in the field.

Close to two billion items a year now roll off the machines designed and constructed by Keyes personnel. Total production for the full 50 years of operation is well over 40 billion items, and the 20 billion Paprus plates that have been sold would alone encircle the earth three times.

The original paper plate machine could produce about 1,000 pie plates an hour. Modern equipment is now turning out more than 20,000 an hour. The firm is among the 20 largest Maine industries in product value, wages paid and number of employees. It is also one of the state's top 10 pulp and paper concerns.

Manufacturing process

Briefly, an automatic pulp molding machine used in the manufacture of molded pulp articles such as plates and dishes is a device that carries one or more forming dies, each having a porous face of the shape of the desired article. These dies are rotated or reciprocated through a pond of dilute pulp stock, during which process by means of suction a layer of fiber is deposited on the shaped face of the die.

After this die leaves the pulp stock, there is a short interval of time that allows for the suction drainage of free water from the deposited sheet of pulp. The formed article is then usually compressed between this forming die and a complemental die. It is then removed from the forming die by this complemental or pressing die and then transferred by some means to a dryer conveyor or further sets of drying dies.

Employing the most modern and extensive research facilities available in the industry, a 50-man research and engineering staff works constantly in the development of new ideas. Among recent developments has been the creation of new packaging for a Midwest sausage manufacturer who has had unsatisfactory results because of poor packaging. Keyes solved the problem with a molded pulp package.

The main molding plant and general offices are at Waterville, with a second molding plant—constructed in 1947 — at Hammond, Ind. The groundwood pulp mill is located at Shawmut, Maine.

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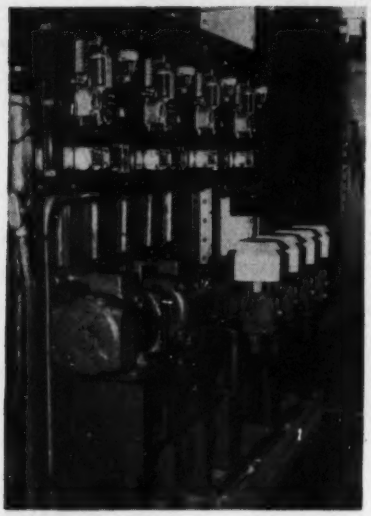
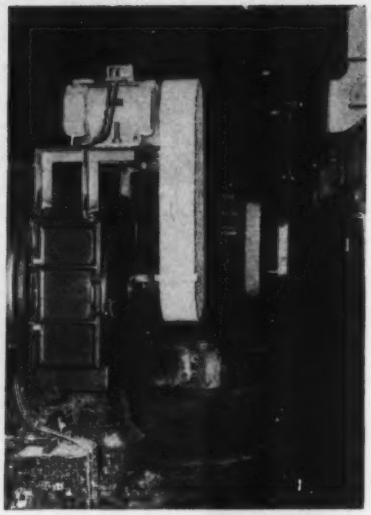
$600,000 Bleach Plant Planned by St. Regis

St. Regis Paper Co. announces plans to proceed at once with a new plant at its Bucksport, Maine mill



NEW CONTROL installed on No. 9 gives direct supervision of machine speed



SPEED TRANSMISSION generators located on top section of motors at backside

Improved Operation at Mando with Constant Speed Control

A new type control for holding speed constant between the various paper machine sections has been installed on No. 9 machine at the Kenora, Ont. newsprint mill of Minnesota & Ontario Paper Co.

Of Harland design, the control was supplied by Bepco of Montreal and operates on the same basic principle as the equipment it replaces. Embodying the improvements made in such equipment over a period of 30 years, it is said to be suitable for present day speeds.

Complete regulation is possible from the main switchboard. An advantage of the new unit is the fact that no longer is it necessary for the backside of the machine to be "cluttered" with a master speed reference shaft, differential gears, cone pulleys, etc.

for the bleaching of sulfite pulp. The new bleach plant will incorporate the most advanced techniques in peroxide bleaching of pulp and will expand the capacity at the mill to a level that will permit bleaching the entire output. Cost of the facilities will exceed $600,000. Completion is expected in late summer.

St. Regis was a pioneer in the use of sodium peroxide pulps, having early recognized the advantages that might come from the adoption and use of the process developed in the laboratories of E. I. du Pont de Nemours & Co.

•

New Tissue Machine for St. Helens Pulp & Paper

A tissue machine described as the largest of its kind in the world will be installed in the plant of St. Helens Pulp & Paper Co. at St. Helens, Ore. According to J. D. Zellerbach, president of Crown Zellerbach Corp., the Beloit Iron Works unit will be producing in early 1955.

C-Z has authorized expenditures of between $14,000,000 and $15,000,000 for the new machine, the modernization and speed-up of an existing machine, an increase in pulp capacities, and other buildings and installations designed to modernize and substantially increase production at St. Helens.

The tissue machine will bring to 44 the number of primary paper machines now operating in Crown Zellerbach mills, 34 of them in Washington and Oregon. It will be a 258-in. Yankee dry crepe tissue unit capable of making dry crepe toilet, napkin and facial type grades from bleached kraft pulp. Its annual capacity is to be 35,000 tons.

•

John Strange Power Plant Under Construction

The power plant being built for John Strange Paper Co. of Menasha, Wis., will be in opreation sometime this fall. Erection of the boiler is under way.

Union Iron Works of Erie, Pa., is furnishing the boiler, which will be a four-drum bent tube Sterling type with a maximum capacity of 165,000 lb. steam per hour at 725 lb. pressure and 825°F. The stoker will be a Rotograte of the continuous ash discharge type and manufactured by Detroit Stoker Co.; the superheater and economizer by Foster Wheeler Corp.; the dust collector by Western Precipitation Corp.; the two-speed forced draft fan by Buffalo Forge Co., and the dual-drive induced draft fan by American Blower Corp.

The steam turbine generating unit, with direct connected generator, is being built by Allis-Chalmers Mfg. Co. It is to be an impulse non-condensing type exhausting at 40 to 50 lb. pressure with provision for uncontrolled extraction. It will operate at a steam pressure of 725 lb. and temperature of 825°F.

•

Manistique Improvements

Manistique Pulp & Paper Co. of Manistique, Mich., has completed the remodeling necessitated by the installation of a new trimmer. According to R. G. Hentschell, general manager, the trimmer was to be placed in operation during the second week in March.

Operations at the mill were resumed March 1 following installation of a 650-hp steam turbine. The mill produces groundwood specialties.

Earlier improvements at the plant included a paper cutter and layboy installation. Remodeling now underway includes the construction of a new floor, enlargement of the finishing room, and the removal of a wall to permit installation of the trimmer.

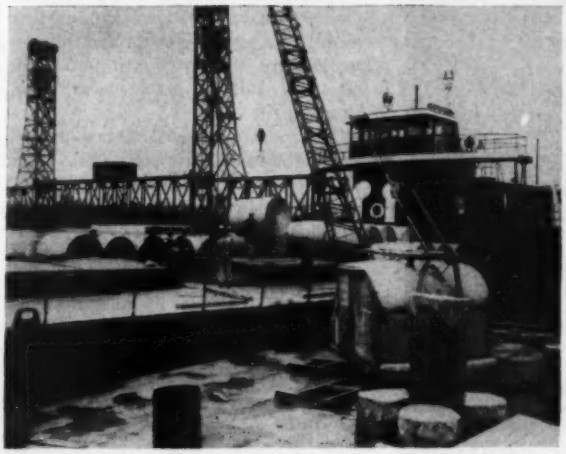
•

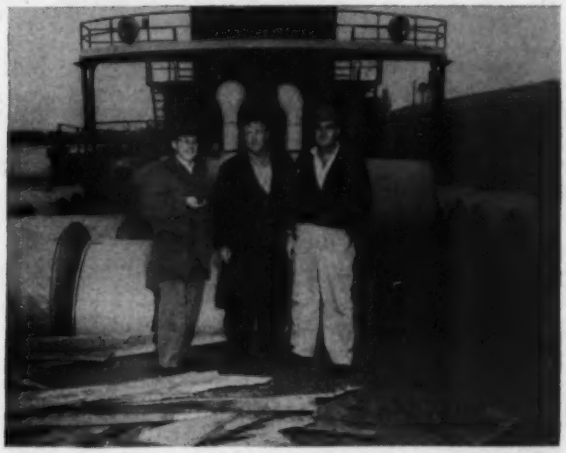
Crossett Expansion Under Way

Expansion of facilities to include the production of bleached board is

NEW DIGESTER recently presented to the paper technology department of Western Michigan College at Kalamazoo by Port Huron Sulphite & Paper Co.; the laboratory size stainless steel unit was produced by Michigan Steel Casting Co. of Detroit; inspecting the gift are R. T. Elias, associate professor, and Ted Jewson, senior student in the department

Inland Waterway Route Carries Output of Southern Mill





REPLACING A 55-CAR freight train, the Vessel Belvedere is currently plying the Inland Waterway transporting paperboard from the Savannah, Ga. plant of Union Bag & Paper Corp. to that firm's processing operation in Trenton, N. J.; of 1023-ton displacement and a "cross between a barge and an ocean cargo ship," the Belvedere requires four days for the journey; she has the largest tonnage displacement of any craft working the waterway and can carry some 1800 tons of cargo; the latest word in river freighting, the Belvedere carries a crew of 10, is equipped with the latest in radar and has a ship-to-shore telephone system.

Above (left) stevedores hustle to make the cargo secure before the vessel leaves Savannah; at right, Frank Futrelle of paper finishing and shipping, Ivey Willis, in charge of loading, and Capt. James T. Gaskill; owner of the Belvedere is C. G. Willis Inc.

now well under way at Crossett Paper Mills, Crossett, Ark. Early in February the grading and preparation of the mill site was 70 per cent complete.

Equipment already purchased includes: double disc refiners (the Bauer Bros. Co.); bleaching equipment (Improved Machinery Inc.); Lombard chip crusher (Waterville Iron Works); 104-in. chipper (Carthage Machine Co.); digesters (Chicago Bridge & Iron Co.); barking drum (Fibre Making Processes Inc.), and a 216-in. cylinder machine (Beloit Iron Works).

The new mill is expected to be in operation by the summer of 1955. Engineering and design is by J. E. Sirrine Co. In charge of the expansion program is D. B. Kuhe.

•

Bird & Son Converts Water System at East Walpole

The conversion of the water treating system for its East Walpole, Mass. power plant has been announced by Bird & Son inc. Formerly a hot phosphate system, hot zeolite is now being used. Designer-engineer on the project is the Rust Engineering Co. of Pittsburgh.

Rust has completed design-engineering services for the conversion of the present system, including engineering for structural alterations and changes in existing equipment. Suppliers include: Cochrane Corp. (water softeners, salt tank, brine tank, caustic tank and blowdown tank): Weinman Pump Mfg. Co. (brine pump); Milton Roy Co. (caustic and alum pumps), and Warren Steam Pump Co. Inc. (booster pumps).

•

St. Regis Plans Bag Plant

St. Regis Paper Co. has announced that it will construct a multiwall bag manufacturing plant in Franklin, Va. The operation, which will be built on a 21-acre site, is to replace the one presently leased from Camp Mfg. Co. Camp requires the existing plant for its own expanded operations.

Construction of the new facilities, which will provide floor space of 160,000 sq. ft., is to start soon. The structure will house four tuber lines, printing and engraving, paper and bag storage, and general offices. It will be occupied by St. Regis on a long-term lease.

•

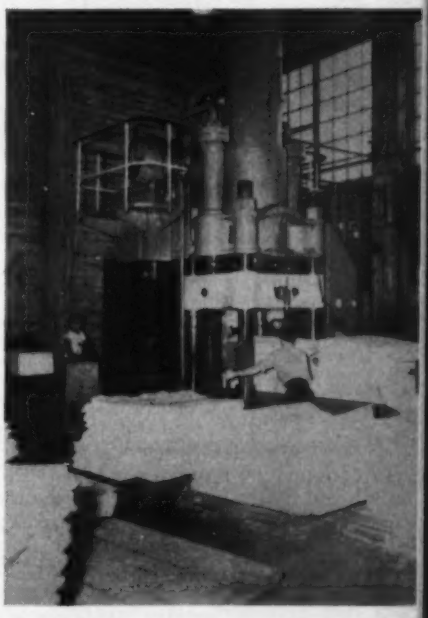
New Jersey Firm Purchases Idle American Tissue Mill

The Stony Brook Division of American Tissue Mills at South Hadley, Mass., has been purchased by Marcalus Co., Patterson, N. J. The latter firm is one of the nation's largest producers of wax and tissue papers.

The two-machine mill, idle for nine months, was being readied for operation early in March. The new owners plan to run the plant on a full-time basis. There were 55 employed at the mill prior to the collapse of American Tissue last May; the new owners expect to expand this number.

The Stony Brook Division boasts a Yankee machine with a 78-in. trim and a fourdrinier that trims 96 in. The latter is especially suitable for the Marcalus firm.

Marcalus owns and operates mills



THE SQUEEZE is put on bleached sheet sulfate pulp for wrapping and binding by MacMillan & Bloedel Ltd., Harmac, B. C.; part of a recent $40,000,000 plant expansion program, this self contained hydraulic press was designed by Baldwin-Lima-Hamilton Corp. of Philadelphia and built by United Steel Corp.; the tightly compressed blocks of pulp speed up handling and shipping

KALAMAZOO RIVER mill of Michigan Paper Co. that was recently purchased by W. C. Hamilton & Sons of Miquon, Pa., as a wholly owned subsidiary; no changes in management, personnel or policies of the 160,000-lb. per day plant are planned, and Allan B. Milham will continue as president and general manager; three fourdriniers are in operation producing book, lightweight and newsprint; the new owners will push a program of plant modernization and expansion that was started in 1947; Ray Barton is superintendent and in charge of production

at Lincoln and East Patterson, N. J.; Chicago, and Pomona, Cal.

•

Fort Frances Newsprint Machine Rebuild Costs Mando $1,200,000

Work is well underway on the $1,200,000 modernization of Minnesota & Ontario Paper Co.'s No. 7 newsprint machine at Fort Frances, Ont. Completion is expected this month.

The project will increase machine speed some 25 per cent to 1550 fpm and will boost the annual volume of the three-machine mill to some 116,500 tons of newsprint and groundwood specialties.

A principal feature of the modernized machine will be the complete enclosure of the dryer section. The Ross-Hooper enclosed hood, according to J. F. MacKellar, vice president and general manager of the Canadian Division, will increase the drying capacity of the machine and at the same time improve working conditions on the machine room floor. Uniform temperatures will be possible across the entire width of the machine.

Other modernization details include a new stock mixing and proportioning system an additional Bird screen, raising of the headbox, three new flat boxes, 16 new rubber-covered table rolls, a new suction couch roll, new enclosed type dryer gearing, new rear and front dryer heads and rear bearings, serveral new dryer felt rolls, new calender stack frames, a high-velocity low-pressure stack cooling system, a new reel and winder to travel at 4500 fpm with electric regenerative drive. The machine will be automatically controlled and will feature the latest Harland type intersectional regulators.

New Manchester Board & Paper Mill in Production

The modern Seaboard mill of Manchester Board & Paper Co. at Richmond, Va., went int production late in January. Forty-four minutes after start-up, salable paper was going through the cutter.

The new plant is almost completely Black-Clawson equipped. The eight-cylinder board machine was designed and built by the Hamilton (Ohio) division, and the stock preparation equipment was furnished by the Shartle Bros. Division at Middletown.

Manchester's 154-in. machine is the first to be completely equipped with Black-Clawson crownless press rolls. Paper and board of various grades and requiring various degrees of press loading can be run through the rolls with uniform pressure being applied across the entire sheet.

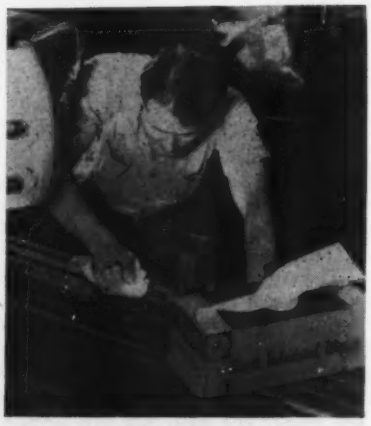
•

West Germany Host to Print and Paper Fair

An international print and paper fair — known as DRUPA 1954 — will be staged at Duesseldorf May 15-30 under the joint sponsorship of seven major industry associations.

The fair is the second held in Germany since the end of World War II. About 500 firms will have exhibits in the show area of about 485,000 sq. ft. Exhibitors are expected among the following categories: printing machinery, papermaking equipment, paper converting machinery, auxiliary machinery and accessories, raw and auxiliary materials, paper and cardboard, paper and cardboard converting, graphic products, commercial art, and trade organizations.

New products from paper



NEW INDUSTRIAL wiper introduced by Scott Paper Co.

New products recently developed by the paper industry are the result of extensive research and testing. These and improvements in existing products are revealed almost daily by firms throughout the country. Selling such items to industry and to the general public necessitates developments in sales methods, a vast field calling for exploration and constant improvement.

Scott Paper Co. of Chester, Pa., has announced the development of two products designed to meet the needs of industry. An all-purpose wiper is fitted to the cleaning needs of any modern service station or garage. The product is packed 125 wipers to the box and 18 boxes to

7 solid reasons why it pays to standardize on LINK-BELT IDLERS

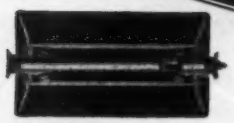
1 STRONG, RIGID FRAMES support rolls in perfect alignment. Rolls are securely held in place but can be easily removed for inspection and service.

2 CONCENTRIC ROLLS have smooth surfaces and rounded edges. Machine-made, continuous welds prevent entrance of dirt and moisture—assure hop-free rotation.

3 HUSKY, HIGHEST QUALITY BEARINGS, free and easy turning, provide concentricity and perfect alignment for smooth operation, minimum belt wear, low power requirements.

4 SAFE, CONVENIENT GREASE FITTINGS provide ease of lubrication. Extensions can be furnished for greater accessibility in out-of-the-way locations.

5 POSITIVE, COMBINATION GREASE SEAL unit retains lubricant, prolongs bearing life. The most effective seal offered in idlers today!



6 ROLLS consist of a counterbored outer shell plus a full-length, heavy central tube of 3/16-in. steel. Both tube and shell are welded to dished steel heads to maintain balance and bearing alignment.

7 HEX NUTS provide bearing adjustment at shaft ends and prevent rotation in service. Nuts prevent bracket from spreading under unusual impact.

Get the right idler from industry's most comprehensive line

Link-Belt makes more than 500 belt conveyor idlers in 34 types. You can select from light, medium or heavy-duty 20° troughing idlers, two types of 45° idlers, flat belt, belt training, rubber cushion and the new Link-Belt variable troughing idler. Most are built in a broad range of roll diameters and belt widths with matching return idlers. Ask your Link-Belt sales representative or distributor for new 48-page Book 2416.

LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 19.415

G&K Leather Belting "bear hugs" the pulleys for top production-power

It Grips — Leather's resilient, frictional surface "bear hugs" the pulley face, causing belt and pulley to move as one power unit.

It Pulls — Leather is strong, flexible, with controlled stretch — gives peak performance on *any* drive.

It's 3-Dimensional — Leather's millions of fibres are interlaced in all directions to form the tough *three-dimensional* structure so necessary for PULLINGRIP . . . *developed to the highest degree in G&K Leather Belting.*

Call your G&K Industrial Supplies Distributor for flat, round, link and V-belting, belt lacing, dressings, cements, packings and specialty leathers. Free Belting Catalog.

B-1

GRATON AND KNIGHT

Memo: **Paper Mill Superintendents**

Maybe you don't have a drive like the one illustrated. But every drive in your mill — from beaters to take-off reels — must keep pulling at top efficiency with minimum stretch. That's why superintendents specify G&K RESEARCH® brand for long, continuous, *reliable* service under wet-end conditions . . . and on *all* drives.

GRATON & KNIGHT *Company*

WORCESTER, MASSACHUSETTS

World's Largest Manufacturer of Industrial Leather Products

the case. According to G. Willing Pepper, Scott vice president and director, the "secret" of the product "lies in its revolutionary paper surface . . . Each sheet has thousands of minute perforations to accelerate widespread and efficient absorption of both oil and water." Each wiper consists of two sheets which, through a special process, are welded together for extra strength.

The second Scott product is aimed at the general wiping needs of industry. In response to requests from industrial organizations, Scott engineers devoted extensive testing and research efforts to developing "highly absorbent, versatile, always handy and easily disposable tissues." Special chemical treatment creates all-important wet strength. "Efficient performance is possible in the complete range of industrial wiping from heavy machine to precision work."

K-C improves wiping tissue

A new improved version of Kimwipes, industrial wiping tissues, began rolling off the production line recently at the Neenah, Wis. plant of **Kimberly-Clark Corp.** The product has been made "almost completely lint-free by virtue of a new manufacturing process." Kimwipes are served one at a time from a new tab "hang-up" carton.

The tissues by Kimberly-Clark have been used for many years in all branches of industry for virtually every wiping, cleaning, and polishing job conceivable.

Photographic copy paper

E. I. duPont de Nemours & Co. has announced a new, thin-base photographic copy paper. Made of 100 per cent rag stock, it is known as Photo-Writ W. Although thinner — 0.0035-in. with emulsion as compared with 0.0055-in. for duPont's standard weight Photo-Writ B — the paper is stronger than surface B, wet or dry.

Multiple copies without carbon

A new paper that provides multiple copies of business forms without the use of carbon paper inserts has been revealed by **National Cash Register Co.** of Dayton, Ohio. The treated paper utilizes the reaction of a colorless chemical coating to a clay-like material.

The process uses combinations of two different coatings on ordinary paper, depending on how many copies are desired. For example, in a business form containing an original and two copies, the underside

FOURTH ANNUAL Honor Award of the University of Maine Pulp & Paper Foundation is presented to Prof. Lyle C. Jenness (r), head of the school's engineering department; making the presentation at the U of M alumni luncheon in New York, N. Y., is J. L. Ober, president of the Foundation and vice president of Scott Paper Co.

of the first sheet is coated with the colorless chemical and the top side of the second sheet with the clay-like material, and so on. Up to seven copies can be made on an electric typewriter, and up to four handwritten copies.

Called NCR (no carbon required and also National Cash Register), the new product grew out of research started in 1939 on methods of printing without the use of conventional ink or ink ribbons. Certain components of the new system are being made at Dayton, although the coatings used are applied at the paper mill.

•

Pulp Testers Listed

The Certified Pulp Testers Bureau, New York, N. Y., has released its latest listing of approved pulp testers in the United States and Canada. The Bureau's approval is based upon facilities for weighing, sampling and testing wood pulp for moisture.

Pulp and Paper Mill Laboratories—Anglo-Canadian Pulp & Paper Mills Ltd., Quebec, P. Q. (F. P. Moden); Columbia Cellulose Co. Ltd., Prince Rupert, B. C. (Dr. M. Wayman); Crown Zellerbach Corp., Camas, Wash. (D. F. Church), Port Townsend (Robert R. Marriot), and West Linn, Ore. (Clarence A. Enghouse); Fibreboard Products Inc., Port Angeles, Wash. (Nelson Hartnagel); Hollingsworth & Whitney Co., Mobile, Ala. (C. D. Ingram); Howe Sound Pulp Co. Ltd., Port Mellon, B. C. (W. W. Brown); Hummel-Ross Div. of Continental Can Co., Hopewell, Va. (G. R. Tennett); MacMillan & Bloedel

Specify TISCO® MANGANESE STEEL

The longest-wearing steel for the toughest Wear Parts!

Barking Drum Chain

Conveyor Chain with log haul attachment

Jordan Plugs, Linings and Sleeves

Beater Rolls

Rag Slitters

•

Also other chain and wear parts

Claflin Plug and Liner

Simply ordering "manganese steel" wear parts does not assure the fullest durability and toughness of which this great wear-resistant steel is capable.

Add the word "TISCO" to your specifications and orders. Get manganese steel at its best—produced by Taylor-Wharton, first to cast Hadfields manganese steel in America and offering the longest experience in the production and application of manganese steel to parts subject to heavy impact and abrasion.

TISCO assures the right analysis for your job—soundly cast and properly heat-treated—ground to accurate dimensions—inspected by the most modern techniques, including Gamma Rays, to insure perfect castings.

Specify TISCO Manganese Steel when ordering new equipment or replacement parts. Write for descriptive bulletins.

Repair and rebuild with TIMANG WELD ROD

Flows easily, air toughening, no quenching. Produces clean, uniform welds, equal in strength to original metal.

TW

Founded 1742

TAYLOR-WHARTON IRON AND STEEL CO.

High Bridge, N. J. — Cincinnati, O. — Birmingham, Ala. — Easton, Pa

To get the best gasketings for all your requirements...

Specify

GARLOCK GASKETS

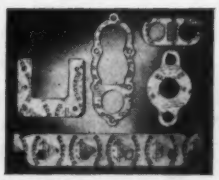
Made from these materials:

Asbestos, compressed	Natural rubber
Asbestos, metallic	Synthetic rubbers including:
Asbestos, woven	Buna-N (Hycar)
Cork-fibre, glycerine treated or synthetic-rubber impregnated	Butyl
Leather	GR-S
Kel-F†	Neoprene
Teflon‡	Silicone
	Thiokol
	Vegetable fibre

There is always *one* type of gasketing material that's best for a particular application. When you call on Garlock, you're sure to get the material you need to meet your specific service requirements. Here's why: Garlock can furnish sheet packing or cut gaskets made from *any* one of the basic gasketing materials. We are *not* limited to a few gasketing specialties.

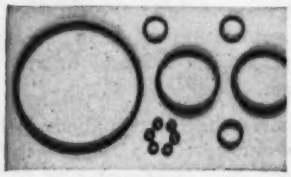
Therefore, whenever you need gaskets call in your Garlock representative. He can supply you with the type of gasket that will best meet your requirements.

Molded Rubber Gasketing Devices



Duck Inserted Rubber Gaskets

Cork-Fibre Sheet



"O" Ring Gaskets

"Teflon" Envelope Type Gaskets with Compressible Fillers

GUARDIAN* Asbestos-Metallic Gaskets

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†The Kellogg Company's Trademark

‡Du Pont's Trademark for its Tetrafluoroethylene resin

GARLOCK PACKINGS, GASKETS, OIL SEALS MECHANICAL SEALS RUBBER EXPANSION JOINTS

Ltd., Nanaimo, B. C. (Eric T. Guest) and Port Alberni (D. L. Amos); National Container Corp., Jacksonville, Fla. (C. L. Smith); Ontario Paper Co. Ltd., Thorold, Ont. (A. B. Gorham); Publishers Paper Co., Oregon City, Ore. (F. J. Weleber); Restigouche Co. Ltd., Campbellton, N. B. (Clarence T. Clark); St. Joe Paper Co., Port St. Joe, Fla. (B. Roy Gibson), and Scott Paper Co., Everett, Wash. (N. S. Lea.)

Commercial Laboratories—A. B. Andrews, Lewiston, Maine; Danneker & Evans Inc., New Orleans; J. T. Donald & Co. Ltd., Montreal; Neil C. Goodrich, South Haven Terminal Co. Inc., South Haven, Mich.; Gulick-Henderson Laboratories, Chicago; L. Gutiernez-Vela, Galveston Laboratories, Galveston, Texas; Hamlin & Morrison, Philadelphia; William Landes, Paper and Pulp Testing Laboratory, New York, N. Y.; Alfred H. Nadelman, Kalamazoo, Mich.; Orthmann Laboratories Inc., Milwaukee; Skinner & Sherman Inc., Boston; John H. Sutliff, Slingerlands, N. Y.; U. S. Testing Co. Inc., Hoboken, N. J.; E. F. Whittington, Kalamazoo; Wiley & Co. Inc., Baltimore, and Williams Apparatus Co. Inc., Watertown, N. Y.

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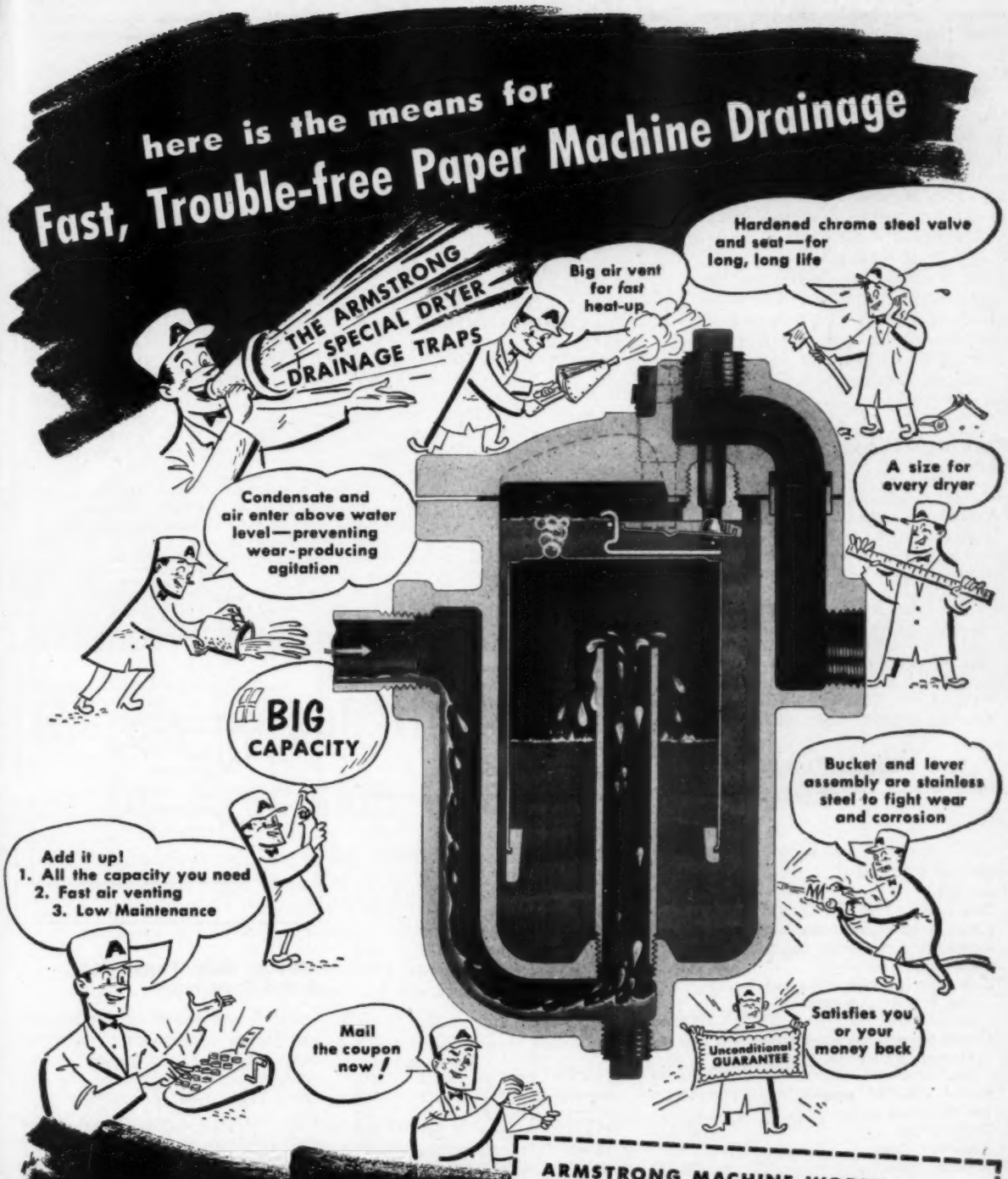
Paper Industry Expansion Notes

Hennepen Paper Co. of Little Falls, Minn., has begun operation of its new groundwood bleachery. The groundwood is bleached batch-wide in three agitated and circulated retention chests with a combination formula of sodium peroxide and hydrogen peroxide... Directors of **Coosa River Newsprint Co.** of Coosa Pines, Ala., have authorized an expansion in capacity "over a period of the next few years." ... **Marathon Corp.** has announced plans to remodel a building it leases in Neenah, Wis. The project, which will cost about $100,000, calls for interior renovation and the construction of an 18- by 18-ft. elevator shaft and a 16- by 34-ft. reception room.

National Gypsum Co.'s plant at Savannah, Ga., has reopened after a week's shut-down to allow a switch-over in the drying operations. The project was the last phase of a $1,000,000 expansion program .... The Madison branch of the Georgia & Florida Railroad has been transferred to the new Valdosta-Southern Railroad, wholly owned subsidiary of **National Container Corp.** The V-S, running approximately 28 miles from Madison, Fla., to Valdosta, will connect National Container's

here is the means for

Fast, Trouble-free Paper Machine Drainage


THE ARMSTRONG SPECIAL DRYER DRAINAGE TRAPS
Big air vent for fast heat-up
Hardened chrome steel valve and seat—for long, long life
A size for every dryer
Condensate and air enter above water level—preventing wear-producing agitation
BIG CAPACITY
Bucket and lever assembly are stainless steel to fight wear and corrosion
Add it up!
1. All the capacity you need
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Dryer Drainage Traps . . . Moisture Control for Paper Machines . . . Individual Dryer Temperature Control . . . Thermal Air Eliminator . . . Steam Humidifiers . . . Inverted Bucket Steam Traps

ARMSTRONG MACHINE WORKS
816 Hoffman Street, Three Rivers, Michigan

SEND ME BULLETIN 205
explaining Armstrong Dryer Drainage Traps.

Name_____

Company_____

Street Address_____

City_____ State_____

recently completed mill to four trunk lines — the G & F, Seaboard Air Line, Atlantic Coast Line, and Georgia Southern & Florida.

Wrenn Paper Co. of Middletown, Ohio, has disclosed a plan to rebuild its 84-in, fourdrinier and to extend the building housing it. Extension of the structure, according to President J. J. Hallowell, will make possible better control over production, processing, and final quality.

The J. P. Lewis Co. of Beaver Falls, N. Y., has acquired all the capital stock of Brownville Board Co. of Brownville. Both firms manufacture similar paperboard products and since 1944 have maintained a common sales outlet, Lewis-Brownville Sales Inc.

Coming Events

TAPPI

April 22—Delaware Valley Section (Automation in the Pulp and Paper Industry), Engineers' Club, Philadelphia
May 11—Lake States Section, annual social meeting, Butte des Morts Club, Appleton, Wis.
May 11—Ohio Section, annual meeting, Hartwell Country Club, Cincinnati
May 14—Southeastern Section, Hotel DeSoto, Savannah, Ga.
May 20-21—Pacific Section (joint meeting with Pacific Coast Superintendents), Gearhart Hotel, Gearhart, Ore.
May 24-26—Fifth Coating Conference, Poland Spring House, Poland Spring, Maine
May 27—Delaware Valley Section (E. J. Albert Award program), Engineers' Club, Philadelphia

American Pulp & Paper Mill Superintendents Association

April 20—Miami Valley Division, American Legion Hall, Middletown, Ohio
May 6-7—Northwestern Division, Leamington Hotel, Minneapolis
May 14—Connecticut Valley Division, Rogers Smith Hotel, Holyoke, Mass.
May 14-15 — Pennsylvania-New Jersey-Delaware Division, Yorktowne Hotel, York, Pa.
May 20-21—Pacific Coast Division (joint meeting with Pacific Section TAPPI), Gearhart Hotel, Gearhart, Ore.
June 4—Miami Valley Division, Orr Felt & Blanket Co., Piqua, Ohio
June 21-23—National Meeting, Sheraton-Mount Royal Hotel, Montreal, Que., Canada

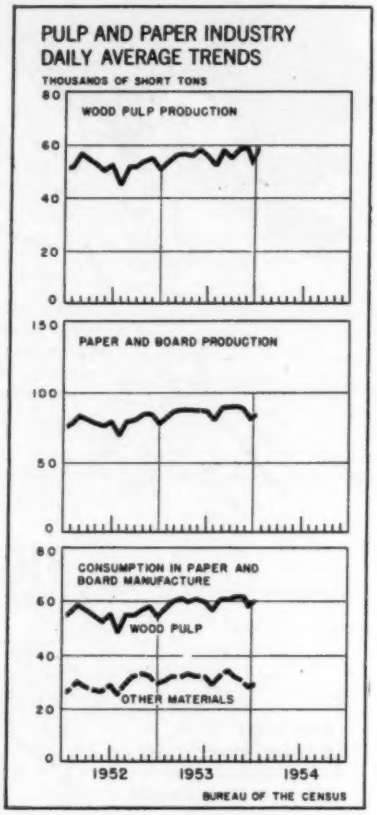
Other meetings

May 2-6—Electrochemical Society Inc., LaSalle Hotel, Chicago
May 3-5—Southern Pulp & Paper Safety Association, annual convention, Richmond, Va.
May 5-7—American Society of Training Directors, 10th annual conference, Schroeder Hotel, Milwaukee
May 5-7—Forest Products Research Society, annual meeting, Grand Rapids, Mich.
May 10-11—Technical Association of the Graphic Arts, sixth annual meeting, Schroeder Hotel, Milwaukee
May 23-25—National Paperboard Association, spring meeting, Grove Park Inn, Asheville, N. C.
May 31-June 11—Seventh Canadian International Trade Fair, Toronto
June 14-17—CPPA, Technical Section, summer meeting, Empress Hotel, Victoria, B. C.

U. S. Paper and Paperboard Production

	Jan. 1954 (tons)	Dec. 1953 (tons)	Jan. 1953 (tons)	Total 1953* (1,000 tons)	Total 1948
Paper and Board, total	2,162,706	2,023,074	2,204,640	26,566	21,897
Paper, total	978,206	926,858	965,806	11,387	11,119
Newsprint	95,149	88,299	90,947	1,065	876
Groundwood paper (uncoated)	67,910	66,257	68,375	782	772
Printing and converting (coated)	104,653	97,394	100,170	1,182	809
Book paper (uncoated)	133,499	125,977	137,328	1,630	1,570
Fine paper (writing, cover and text, bristols, thin paper and other)	103,041	104,122	104,212	1,280	1,141
Coarse paper (unbleached kraft, glassine, greaseproof, vegetable parchment and other)	297,195	279,271	289,853	3,422	3,027
Special industrial paper	33,279	35,395	36,904	411	308
Sanitary tissue stock	111,223	101,571	106,338	1,255	983
Tissue paper	22,312	17,611	19,899	233	205
Absorbent paper	9,945	10,941	11,780	128	107
Paperboard, total	984,447	904,172	1,018,316	12,307	9,366
Container board, total	**527,670**	**481,863**	**558,593**	**6,740**	**5,079**
Liners	364,092	317,484	376,349	4,541	3,347
Corrugating material	141,872	142,169	152,833	1,873	1,376
Container chipboard	21,706	22,210	29,411	326	319
Bending board	297,624	276,103	282,891	3,552	2,153
Non-bending board	72,367	64,706	72,729	936	597
Special paperboard stock	80,179	75,117	91,967	990	1,568
Cardboard	6,607	6,383	12,136	88	87
Wet machine board, total	11,691	11,986	13,712	155	142
Construction paper and board, total	188,362	180,058	206,806	2,718	2,591
Construction paper	87,243	85,438	87,602	1,317	1,321
Hardboard and insulating board	101,119	94,620	119,204	1,401	1,270

(*) Preliminary report. *Source: U. S. Department of Commerce.*



January Pulp, Paper and Board Production

Paper and board production during January amounted to 2,162,706 tons, according to a report recently released by the Bureau of the Census. This is an approximate 2 per cent decrease from the 2,204,640 tons produced in January 1953. Paper production, amounting to 978,206 tons, registered a slight increase from the 965,806 tons produced in January a year ago. The output of paperboard grades during the month, amounting to 984,447 tons, reflected a decrease of 3 per cent from the production of 1,018,316 tons reported in January 1953.

Wood Pulp Production during January amounted to 1,490,875 tons, as compared to 1,470,863 tons in January 1953.

There's no substitute for Precision Quality

The tolerance standards set for manufacture of Bagley & Sewall designed paper making machinery are no less than the requirements necessary in fine watch making.

We think the best evidence of the fact that there's no substitute for precision manufacture is in Bagley & Sewall machinery still maintaining production at the designed speeds and efficiency, after years of constant operation.

Bagley & Sewall is setting the pace for designs and productions of the wide and high speed paper machines for today's paper industry needs. A tribute to the precision craftsmanship that went into their manufacture, these modern machines respond fast and accurately with watch-like smoothness to operating controls.

Yours for the asking — and our engineering staff welcomes the opportunity — to apply Bagley & Sewall newest designs in a plan to meet your requirements in paper making machinery — machinery always built with precision quality.

designers and builders of paper making machinery
Since 1853

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West Coast Representative: **DAN CHARLES AGENCY, 1331 Third Avenue, Seattle 1, Washington**
Finland Representative: **AKTIEBOLAGET EKSTROMS MASKINAFFAR, Helsingfors, Finland**

Film forming corrosion inhibitors also aid heat transfer

WILLIAM A. TANZOLA* and JAY G. WEIDMAN**

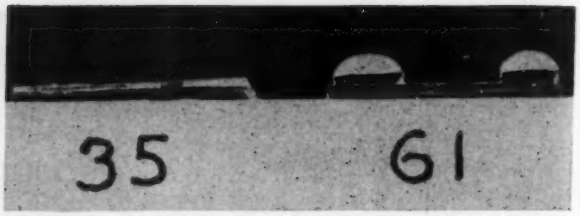


Fig. 1—Untreated specimen on left with water film; treated specimen on right shows non-wettable characteristic produced by filming amine

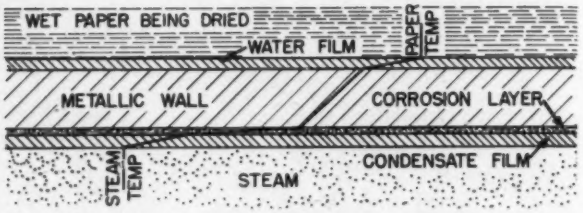


Fig. 2—Temperature gradient through various films and metal wall

▶ A paper mill's dryer capacity can be increased 5 - 10 per cent by feeding a film-forming amine into the steam, as shown by a number of case histories.

▶ The function of the film-forming amine is that of (a) preventing corrosion-film formation on the inside surface of the dryer, and (b) causing dropwise condensation of steam on this surface.

THE USE OF FILMING AMINES for the prevention of steam and condensate line corrosion has expanded rapidly in the past five years. Over 500 plants are employing filming amines for corrosion prevention. The technical literature contains many references (1, 2, 3, 4, 5) to the protection afforded by these materials and the attendant reduction in maintenance costs secured through protection against corrosion.

The filming amines function by forming a non-wettable film over the metal surfaces contacted. The film acts as a barrier between the metal and the condensate, and since the metal does not become wetted, corrosion is prevented even in the presence of condensate containing large amounts of carbon dioxide and oxygen. The non-wettable characteristic of metal possessing the film is illustrated by Fig. 1. It will be noted that the drop of water assumes a spherical shape compared to the spreading effect secured on untreated metal. The spherical drop of water rolls freely over the metal without producing a water film, and the metal remains dry.

When the filming amines were first introduced the question often asked was whether the non-wettable film produced by these materials would interfere with heat transfer.

Because of the spherical shape assumed by the drops of water and since the metal does not become wet with a film of water, it was believed that the amine film would actually increase heat transfer by inducing dropwise condensation. References to the literature (6, 7) shows that dropwise condensation can produce over-all coefficients of heat transfer four to eight times as high as film condensation. One theory why dropwise condensation can be expected to increase heat transfer was expressed by Nagle (7). Since the condensate is in the form of spherical drops, a substantial portion of the condensing surface is directly exposed to the steam and is available for effecting heat transfer at its maximum rate.

Heat transfer equation

The basic equation for heat transfer is expressed by the following formula:

$$(1)\quad Q = U \times A \times \Delta t$$

Where:

Q = Total rate of heat flow, Btu./hr.

U = Over-all coefficient of heat transfer, Btu/sq. ft./hr./degree F.

A = Surface area available to transfer heat, sq. ft.

Δt = Mean effective temperature difference between the hot and cold fluids, degrees F.

The effect of the amine film on heat transfer is of considerable interest to the paper industry, where dryer capabilities frequently limit production. Where space requirements prevent an increase in dryer area, and the dryers are operating at the maximum allowable pressure, reference to equation (1) shows that it is possible to increase dryer capacity only by increasing the coefficient of heat transfer.

The value of the coefficient of heat flow from steam to paper sheet is determined by the conditions prevailing on the inside and on the surface of the dryers. These conditions will vary at individual plants. The values of film and scale conductances will also vary with conditions. It is therefore necessary to employ experimental methods for accurate determination of the over-all coefficient of heat transfer. However, to illustrate the benefits secured from dropwise condensation, the increase in the over-all coefficient of heat transfer obtained through the feed of a filming amine can be estimated.

The over-all rate of heat transfer, U, involves many factors, and to determine this value for the transfer of heat from the steam to the outer dryer surface for a paper mill dryer, the following must be considered:

*Assistant technical director, W. H. & L. D. Betz, Philadelphia.
**Chemical engineer, W. H. & L. D. Betz, Philadelphia.

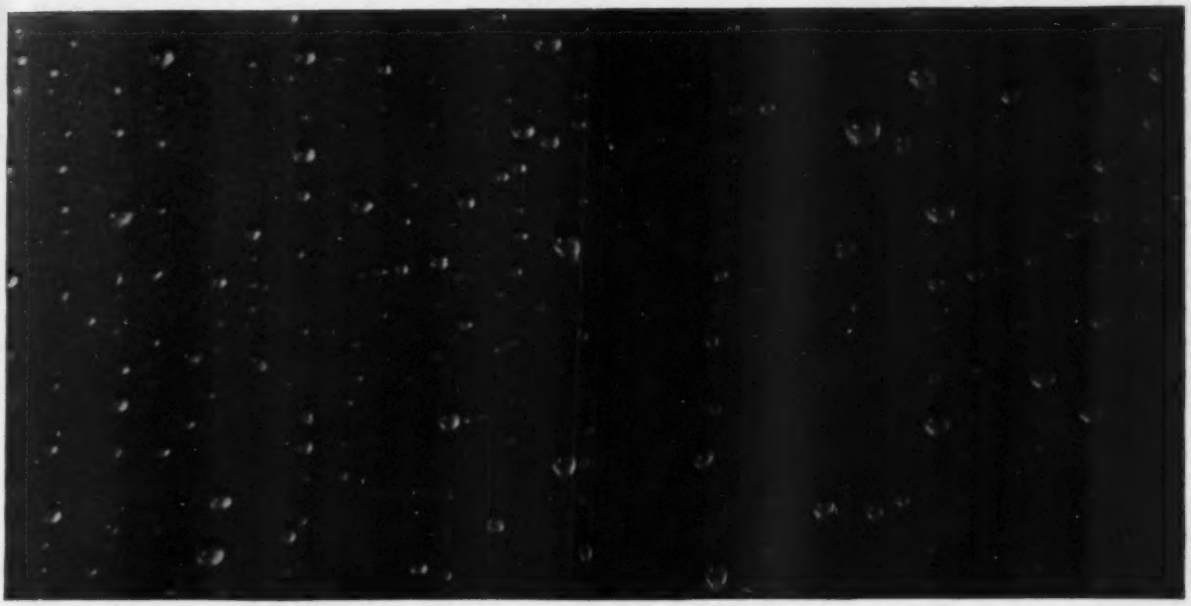


Fig. 3—Dropwise condensation produced by filming amine

1. The thermal conductivity and thickness of the metallic wall.

2. The conductance of the condensate and water films on both sides of the dryer wall.

3. The conductance of the scale or corrosion film on the steam side of the dryer.

Fig. 2 illustrates the effect of these factors on the temperature difference. Employing these resistances to heat transfer, the equation for computing U is as follows:

$$(2)U = \frac{1}{\frac{X}{K} + \frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3} + \frac{1}{h_4}}$$

Where:

K = Conductivity of the metal, Btu./hr./sq. ft./degree F/inch thickness

X = Thickness of metallic wall, inches

h_1, h_2, h_3, h_4 = Conductance of the surface films and corrosion scales or deposits, Btu./hr./sq. ft./degree F.

Examination of factors affecting the over-all coefficient of heat transfer will readily show that the resistance through the water film and corrosion scales or deposits markedly influences the over-all heat transfer coefficient. Should the overall coefficient be calculated for the entire drying operation, it would be necessary to obtain experimental data from one specific plant and on one specific type of paper. The information thus obtained would still be true only for that particular dryer and drying run. Since it is desired to show the effect of dropwise condensation on heat transfer, the sample calculations will exclude the resistance to drying to be expected beyond the water-metal interface on the outer dryer surface. These calculations will show the improvement to be expected in heat transfer through the metal wall only.

Estimated increase in heat transfer coefficient

If we consider a cast iron dryer with 0.5 in. wall thickness and free of iron oxide, we can calculate the value of U before and after feed of the filming amine. In these sample calculations, the film coefficient for air next to the dryers and paper sheet purposely has been ignored for simplification. It is not anticipated that any great change between the sheet and air would occur as a result of promoting dropwise condensation.

Conductivity of cast iron = 322 Btu./hr./sq. ft./ degree F /inch thickness.

Conductance of condensing steam = 1000 Btu./hr./sq. ft./degree F.

Conductance of water being heated (paper sheet) = 300 Btu./hr./sq. ft./degree F.

The value chosen for h for the water film on the outer dryer surface will vary with paper thickness. A value of 300 has been chosen for the sample calculations. In addition to variation with paper thickness, this value will also vary throughout the dryer as the paper dries. This variation has been eliminated for simplification.

Before dropwise condensation is promoted with filming amines, from equation (2), U is:

$$U = \frac{1}{\frac{0.5}{322} + \frac{1}{1000} + \frac{1}{300}}$$

$$= \frac{1}{0.00155 + 0.001 + 0.0033}$$

$$= \frac{1}{0.00585}$$

U = 171 Btu./sq. ft./hr./°F

The above value shows the value for U in a dryer free of a corrosion film on the internal surface. In actual practice, however, some corrosion film will be present. If we assume a film of iron oxide 0.01 in. in thickness, with a thermal conductivity of 1.5 Btu./hr./sq. ft./°F/inch thickness, $1/h_3$ will become 0.01/1.5 = 1/150. In this case, before the feed of a filming amine, U is:

$$U = \frac{1}{\frac{0.5}{322} + \frac{1}{1000} + \frac{1}{300} + \frac{1}{150}}$$

$$= \frac{1}{0.00155+0.001+0.0033+0.00667}$$

$$= \frac{1}{0.01252}$$

= 79 Btu./ sq. ft./hr./°F

Experience with the use of filming amines for corrosion prevention has shown that these materials have the power of penetrating corrosion products and bringing about their removal. After the filming amine has brought about the removal of the corrosion products, the resistance to heat transfer by this film will be eliminated, and $1/h_s$ will become "zero". Researchers (7) have found the conductance of condensing steam to be 14,000 where dropwise condensation is promoted, and under these conditions, U becomes:

$$U = \frac{1}{\frac{0.5}{322} + \frac{1}{14{,}000} + \frac{1}{300} + \frac{0}{1.5}}$$

$$= \frac{1}{0.00155 + 0.00007 + 0.0033 + 0}$$

$$= \frac{1}{0.00492}$$

$$U = 203 \text{ Btu./sq. ft./hr./°F}$$

Therefore, the increase in heat transfer coefficient through the medium of dropwise condensation theoretically will be close to 19 per cent in a dryer free of corrosion films. Where corrosion films are present and are removed by the filming amine, this increase in coefficient will be more than 150 per cent.

The calculated percentage figures shown above are not an estimation for the increase in drying rate which can be expected. These figures show the improvement in the over-all coefficient through the metal wall only. The calculations do indicate, however, that an appreciable increase in this over-all coefficient is possible, which will naturally increase the drying rate.

As explained previously, the foregoing calculations are not accurate, since the effect of the paper sheet and air film have been eliminated for simplicity. The true value for U will undoubtedly be much less. In addition, during operation, either before or after application of an agent to promote dropwise condensation, there will be an accumulation of condensate in the bottom of the dryer. This condensate will be an added resistance to heat transfer, and even with efficient removal measures, while the dryer is in motion, some area of the surface will be coated with a layer of condensate much thicker than the normal film. With increased speed, the area affected will become greater.

As machine speed increases, the centrifugal force increases to the point where the force of gravity pulling the condensate to the bottom of the dryer is overcome. A layer of condensate thicker than the normal film will be present, and dropwise condensation could no longer occur. The tendency to form this thicker layer of condensate is known as "rimming". The speed at which rimming occurs will be proportional to dryer diameter, with greater speeds being necessary as the diameter increases. Where this phenomenon occurs, the benefits to be expected through the use of a filming amine will result from removal of old corrosion products, rather than from dropwise condensation.

The possibilty of securing increased heat transfer efficiency in the dryer operation of paper machines is regarded with favor by many mills. With an increase in U, a lowered temperature difference is possible, permitting use of steam at lower pressure. An increase in efficiency can result in increased machine speed and, consequently, more production. With greater efficiency, some steam savings can also result. Several plants have successfully applied a treatment of this type, and an outline of plant reports will serve to point out the advantages obtained.

Case histories

In the case histories cited, the filming amine employed was octadecylamine, $C_{18}H_{37}NH_2$. This material was fed in the form of the commercial amine dispersion, identified as Permacol.

Felt mill. This mill operates single cylinder machines for the production of roofing and insulating felt. The effect of Permacol in promoting dropwise condensation was tested initially by comparing results on two machines, side by side. Thermocouples were installed on the outside surfaces of the dryer rolls on each machine. Permacol was fed to the steam supplying one machine while the other machine received no Permacol treatment. Before starting the test, the differential between the steam temperature and the outside surface of the dryer roll ranged between 18 — 25° F. After application of Permacol to one machine, the temperature differential on this machine dropped in a few weeks to the range of 8 — 10° F. The temperature differential on the untreated machine remained at 18 — 25° F. during this time.

To eliminate any characteristic of the individual machine, the feed of Permacol was discontinued on the one machine and started on the previously untreated machine. On the machine formerly treated with Permacol, the temperature differential in a few weeks rose until it had climbed again to the range of 18 — 25° F. The second machine, now treated with Permacol, showed a steady decrease in temperature differential until it dropped to the range of 8 — 10° F. Improved heat transfer through the dryers was thus demonstrated.

An average temperature differential with Permacol treated steam will be approximately 12° F. less than when the steam is untreated. A 6.0 — 6.5 per cent increase in machine speed is obtainable with this improved heat transfer.

In some of the mills where Permacol has been applied and where improvement in drying efficiency has been secured, corrosion products were also present in the dryer rolls. With the continued application of Permacol, removal of the iron oxide deposits is secured. Some question has arisen in these cases as to whether improvement secured in dryer efficiency was the result of removal of corrosion products or due to securing dropwise condensation.

Improvement in drying efficiency in this mill was due solely to dropwise condensation and not because of removal of corrosion products. This conclusion can be drawn from the rapid decrease in temperature differential when first applying Permacol. Results were apparent in only a few weeks time. Also, when Permacol feed to this machine was discontinued, only a short time elapsed before the temperature differential had risen again to the range of 18 — 25° F., a period of time insufficient to have developed any appreciable coating of corrosion products.

Specialty paper mill. This mill employs four fourdrinier machines producing 120 tons daily of kraft specialties and sack paper. Due to the many different grades and weights of paper produced, there is appreciable variation in steam requirements per pound of paper. Based on records secured over several months operation in each case, the feed of Permacol permitted a reduction in steam requirements from the former average of 4.1 pounds steam per pound of paper to the range of 3.6 - 3.7 pounds steam per pound of paper. An average reduction of 10 per cent in steam requirements was thus secured through the application of Permacol.

(Continued on page 66)

Mid-West launches new converted paper products

HAROLD R. ALLEY
Technical Director and Safety Coordinator
Mid-West Wax Paper Co.

THE U.S. WAXED PAPER industry, made up of some 40 companies, is currently producing 500,000 tons of waxed paper items annually, ranging in value from 18 to 40¢ per pound.

Mid-West Wax Paper Co., reorganized in 1946 to produce a greatly extended line of packaging materials, now has an annual potential output of $3,000,000. The products manufactured by the company roughly fall into three categories: (1) specialty papers, (2) baking industry papers, and (3) household papers. All items are merchandised through paper merchants and direct sales to consumers. The company's market covers the entire national territory and extends also into Canada, Mexico, Puerto Rico, and Hawaii.

Cost-wise, wax paper is one of the lowest priced, most effective, and highest yield packaging materials. This low cost places wax paper in an excellent competitive position with all foils, films, and flexible sheet materials.

Production facilities

Mid-west operates a $500,000 plant and maintains an inventory of paper, waxes, and cellophane in excess of $250,000 at all times. More than 50 kinds of paper are stocked for standard runs and new products. About seven different basic waxes and five different types of waxing machines permit the production of a great number of new or standard end products. Additional converting facilities, such as printing, die-cutting, sheeting, slitting, interfolding, etc., allow for additional output of unusual and serviceable products.

The bulk of Mid-West's products are made with special waxes. Ordinarily, the waxes are of the petroleum type and are white, odorless, tasteless, 100 per cent pure, fully refined, and of the highest quality obtainable. High melting point paraffin accounts for the largest tonnages. Light colored, microcrystalline, petroleum waxes are often added to increase the moisture and moisture-vapor resistance, as well as to improve flexing properties. Dark colored, special microwaxes are used for the production of ordnance barriers.

Special resins are used for added gloss, tackiness, and moisture resistance in coatings and laminants. Special additives include anti-fungus agents, insecticides, dyes, humectants, etc.

The production of a wide variety of standard or specialty wax paper products requires versatile and precision waxing equipment. This equipment is used to coat, impregnate, transparentize, and laminate various raw stocks with a large number of wax or oil solutions. This equipment consists of five machines, which are also capable of producing dry waxed, wet waxed, coated-1-side, coated-2-side, oil treated, moistened, saturated, transparent, laminated, impregnated, or other special sheets. The treating and coating agents used to produce these sheets range from pure oils or pure waxes to polyethylene with a wide range in raw material prices.

The production machines are equipped with unwind and rewind stands, wax tanks, rolls, thermostatic temperature controls, and numerous coating devices.

The machines handle webs up to 60 in. in width. Wax temperatures range up to 250°F, and wax coating control is attained by adjustable squeeze rolls, tensions, special rods, and blades.

Products

Apart from a variety of products falling in the general categories (1) specification paper products, (2) specialty items, and (3) retail and commercial paper products, the company reports the following new product developments or successful trial production runs:

1. Anti-fungus papers — both oiled and waxed — used for packaging of high moisture content materials.
2. Pyrenone-treated papers for car liners claimed to effect a 98 per cent knock-down of known grain beetles in 24 hours and to resist beetle penetration for about a year.
3. Package over-wraps waxed with special, high gloss, polyethylene wax mixtures and ideally suited for wrapping crackers, cookies, etc.
4. Polyethylene-wax locker papers waxed with improved poly-wax-resin blends. This wrap has a remarkably high water and moisture-vapor resistance.
5. Laminated locker paper made by combining 25-lb. paper with 30-lb. paper using 25 lb. of a special microwax blend.
6. Baking paper for high temperature cake ovens is made by treating certain kraft paper grades with a high quality mineral oil that has a low evaporation rate.
7. Improved high gloss, heat seal bread wrap made by the use of special paper stock, waxes, and resins. Improved moisture retention is achieved through the use of resin additives.
8. Corrosion resistant metal wraps made by saturating a natural, creped kraft with an undeyed pliable wax blend.
9. Papers treated with volatile corrosion inhibitors have been successfully laminated to the commonly known Grade C (scrim/film) greaseproof barrier to yield a Grade C/VPI anti-corrosive wrap.
10. Wet waxed and also dry waxed, metal innerleaver papers for the metal industry.

Pakistan pulp mill installs liquor recovery unit of most recent design

ROBERT GAMBLE
Project Engineer
The Kuljian Corporation

THE RECOVERY UNIT and associated accessories of a sulfate pulp mill are becoming more important each year as the price of coal, salt cake and suitable substitutes go up. The advantages mentioned are apparent, but they must more than offset the investment and upkeep of the required equipment. This investment was found financially sound in the case of the recovery unit now being installed by Karnaphuli Paper Mills at Chandraghona, East Pakistan. Combustion Engineering Inc. was the prime contractor and the Kuljian Corporation served as consulting engineers.

The black liquor recovery unit in this mill has a capacity of 65 tons of soda per day and produces 30,000 pounds of steam per hour at 425 psi and 775° F.

The unit is housed in a building 133 ft. long, 58 ft. wide and 85 ft. high, with building space provided for a similar unit to be installed in the future.

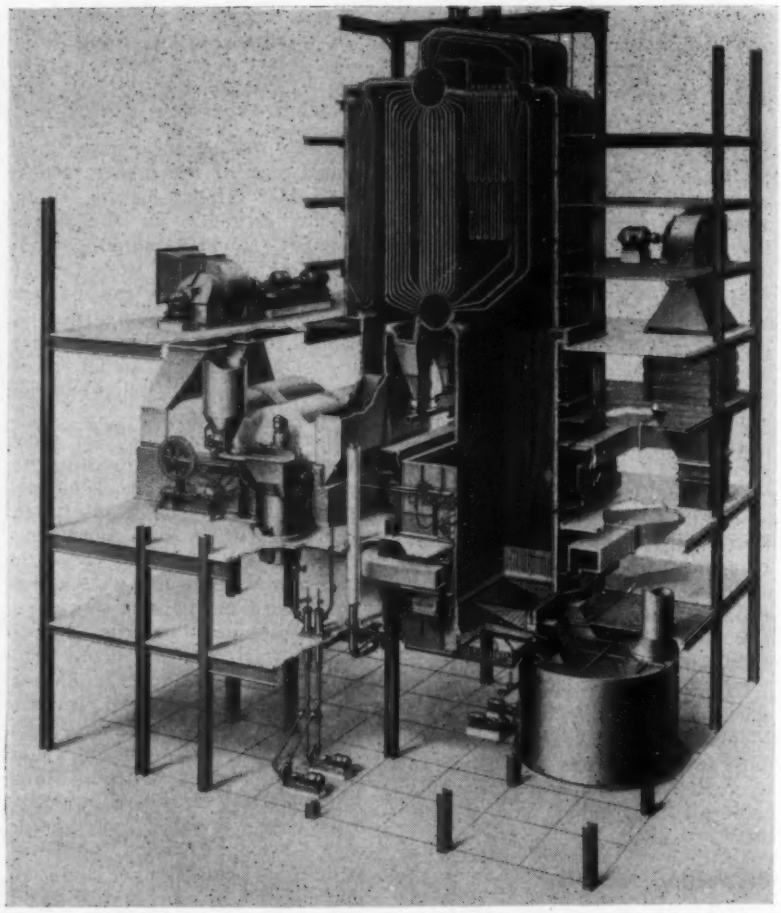
Two black liquor spray nozzles, each having a capacity of 10,675 pounds of liquor per hour, are provided in the recovery furnace and boiler unit. Black liquor is fed to the furnace at 65 per cent solids and 240° F.

In addition, the furnace and boiler unit is provided with six oil burners. When the unit is fired with bunker "C" oil, steam atomized, it has a steam capacity of 50,000 pounds per hour.

The boiler is of the three-drum type complete with superheater section and tube pass hoppers. Design of the furnace hopper is such as to discharge to a water-cooled slag spout, which in turn discharges to the main dissolving tank. At the tank end of the slag spout, smelt shatter nozzles are provided. The shatter nozzles are supplied with green liquor from the main dissolving tank by two green liquor recirculating pumps which discharge the liquor back to the tank along with the shattered slag. Green liquor is circulated at the rate of 400 gpm to the shatter nozzles.

Dust collecting in the tube pass hoppers is removed to the chemical ash tank by liquor transferred by a chemical ash tank recirculating pump.

This is accomplished by recirculating 200 gpm of black liquor containing 50 per cent solids.



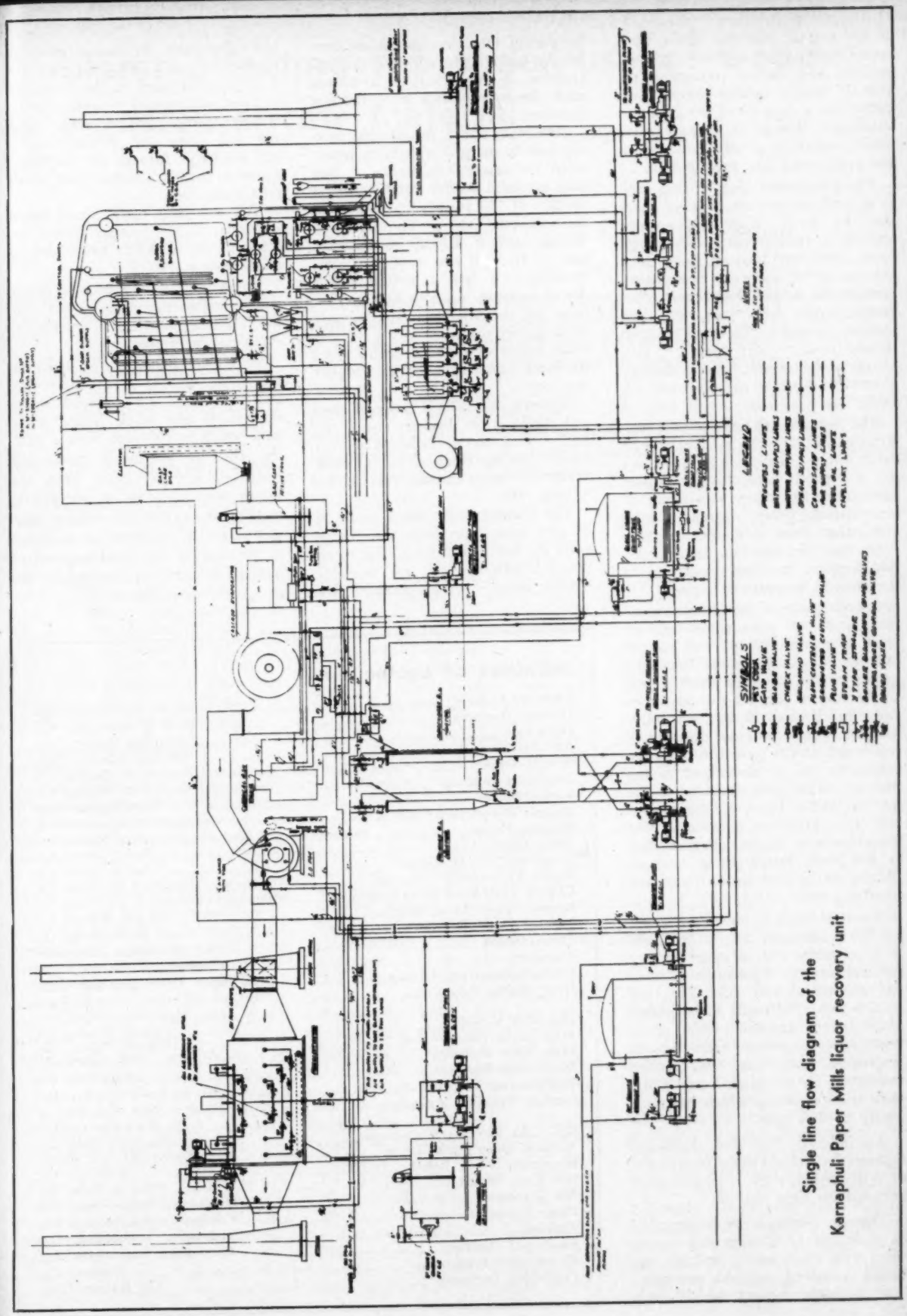
The forced draft fan has a capacity of 65,200 pounds of air per hour at 80° F. When black liquor is burned, the air is preheated by means of a steam air heater. Steam at 150 psi is supplied to the heater at the rate of 4,400 lbs. per hour. When oil is used as a fuel, the air is not preheated.

A main dissolving tank, 12 ft. in diameter by 12 ft. high, made of steel, is equipped with vent stack to roof, housing for slag spout and shatter nozzles, horizontal motor-driven agitator located near the bottom of the tank, suction connections for the green liquor recirculating and green liquor transfer pumps, connections for the weak liquor line from the causticizing plant, connection for drain to sewer, and access manhole.

Two green liquor transfer pumps, with a capacity of 200 gpm each, are provided to transfer the green liquor from the main dissolving tank to the causticizing plant.

Unless stated otherwise, all mention of two pumps refers to one operating and one spare or stand-by unit.

Black liquor from the evaporator building is fed at the rate of 90 gpm to the 30° Baumé steel tank. The tank is 16½ ft. in diameter by 14 ft. high.



Single line flow diagram of the
Karnaphuli Paper Mills liquor recovery unit

It has a vent, manhole, drain, horizontal motor-driven agitator, fill connection, and suction connection for two 30° Baumé transfer pumps. Each pump has a capacity of 90 gpm and discharges through a control valve which maintains a constant level in the precipitator dust mixing tank.

The precipitator dust mixing tank is of steel construction, 7 ft. in diameter by 5 ft. high. Accessories include a vertical motor-driven agitator, drain, overflow, manhole, chute connection for dust from precipitator, connections for liquid level controller, pump supply line connection, and suction connection for two 90 gpm mixing tank transfer pumps. Discharge of the transfer pump is through a control valve to the chemical ash tank.

The chemical ash tank, of steel construction, is 4½ ft. in diameter by 10 ft. high. Included as accessories are a vertical motor-driven agitator, connections for suction and return of recirculating pump, manhole, inlet connection from dust mixing tank, connection for ash line from boiler pass hoppers, and feed connection to the cascade evaporator.

Charging rate of the cascade evaporator is 25,500 pounds per hour of black liquor at 180° F. and 50 per cent solids. It discharges liquor by gravity to the salt cake mixing tank at the rate of 19,300 lbs. per hour and 180° F. and 68 per cent solids content. Flue gas from the furnace and boiler unit is passed through the evaporator and is discharged to the inlet of the induced draft fan at the rate of 90,300 lbs. per hour and at 300° F. Provision is made so that the evaporator can be either drained to the black liquor dump tank or charged by the black liquor dump tank transfer pump.

The steel black liquor dump tank is 12 ft. in diameter by 15 ft. high. It is complete with a steam heating coil and controls to maintain the tank and contents at 180° F. The tank is also equipped with a horizontal motor-driven agitator, tank drain, vent, inlet connection from cascade evaporator, man hole, and suction connection for the black liquor dump tank transfer pump which has a capacity of 200 gpm.

An induced draft fan discharges through ducts either to the precipitator or to the by-pass stack. By-pass gates are used for tight shut-off.

The precipitator is 30 ft. long, 17 ft. wide and 22 ft. high and is supplied with steam heater unit, air operated vibrators, internal conveyors, and discharge hopper which feeds by gravity into the precipitator dust mixing tank. The outlet of the precipitator is connected to a second stack, the by-pass stack being the first mentioned.

As already stated, the salt cake mixing tank is charged with black liquor from the cascade evaporator. Salt cake is added to the mixing tank at the rate of 750 pounds per hour from the salt cake silo. The salt cake mixing tank is 4½ ft. in diameter and 14 ft. high and is of steel construction. It has a vertical motor driven agitator, manhole, and connections for the salt cake feed, cascade feed, gravity discharge to the primary black liquor heater, and return from the black liquor spray nozzle circulating loop.

The salt cake silo is made of steel and is 4½ ft. in diameter and 15 ft. high. This unit is provided with a bucket loading elevator and a screw feeder to supply the salt cake to the mixing tank.

The primary black liquor heater is of the open type with the charge from the salt cake mixing tank being blended with the 150 psi saturated heating steam. A temperature control valve limits the amount of steam supplied so that a temperature of 210° F. is approximated in the discharge.

Two primary and secondary heater transfer pumps are provided. They are fed from the primary heater and discharge through the secondary heater to the black liquor spray nozzle circulating loop.

The secondary black liquor heater is similar to the primary heater, except that the discharge temperature is maintained at 240° F.

In addition to the process system and associated equipment as outlined, the following services are provided to complete the project.

Since black liquor sets up when not maintained at 180° F., all the piping and equipment are arranged to be drained to the black liquor dump tank which is provided with a heating coil as previously mentioned. Half-inch 150 psi steam lines and valves are provided at all process block valves so that the major portion of material in the lines can be blown to the tank. The final removal of material is through piping header and equipment drain valves.

Suppliers of equipment

Chemical Recovery Unit	Combustion Engineering, Inc.
Cascade Evaporator	D. J. Murray Mfg. Co.
Draft Fans	American Blower Corp.
Air Preheater	American Blower Corp.
Soot Blowers	Copes-Vulcan Div., Continental Foundry & Machine Co.
Feedwater Regulator	Copes-Vulcan Div., Continental Foundry & Machine Co.
Liquor Pumps	Worthington Corp.
Electric Motors and Controls	Westinghouse Electric Corp.
Pressure Gages	Ashcroft Div. of Manning Maxwell & Moore, Inc.
Draft Gages	Bailey Meter Co.
Steam and Air Flowmeters	Bailey Meter Co.
Liquor Temperature Controler	Minneapolis-Honeywell Regulator Co.
Cascade Evaporator Level Controller	Minneapolis-Honeywell Regulator Co.
Remote Water Level Indicator	Yarnall Waring Co.
Furnace Draft Regulator	Leeds & Northrup Co.
Thermometers	Taylor Instrument Companies
Ammeters	Westinghouse Electric Corp.
Water Column and Glasses	Diamond Power Specialty Corp.
Boiler Safety Valves	Consolidated Safety Valve Division Manning, Maxwell & Moore, Inc.
Blow Off Valves	Yarnall Waring Co.
Misc. Small Boiler Valves	Edward Valves, Inc.
Large Gear Reducers	The Falk Corp.
Small Gear Reducers	Janette Mfg. Co.
Side Entering Propellor Agitators	Mixing Equipment Co., Inc.
Vertical Propellor Agitator	Shartle Brothers Mfg. Co., Div. of the Black-Clawson Co.
Salt Cake Elevator & Conveyor	The Jeffry Mfg. Co.
Variable Speed Feeder Drive	Sterling Electric Motors
Instrument Panel Board	Falstrom Co.
Salt Cake Screen	W. S. Tyler Co.
Oil Torches	Combustion Engineering, Inc.
Black Liquor Heaters	Combustion Engineering, Inc.
Tankage	Combustion Engineering, Inc.
Stacks and Dampers	Combustion Engineering, Inc.
Electrostatic Precipitator	Koppers Co.
Consulting Engineers	The Kuljian Corp.

Problems affecting the wider use of wood as a technical raw material*

HARRY F. LEWIS
Research Associate
The Institute of Paper Chemistry

Part III—Hardboard production and bark utilization

▶ Successful manufacturers recognize the importance of using high-quality resins in many types of hardboard. The production of low-cost hardboard with improved moisture and color stability would greatly expand the currently saturated market.

▶ Recovery of redwood bark acids and the conversion of redwood bark fibers into low-density structural insulation for low-temperature locker plants are indications of increasing recognition of bark as a useful raw material.

THE TWO PRECEDING PARTS point out some of the general problems relating to the more efficient utilization of wood as a raw material for chemical utilization and for pulping. A third important outlet for wood of the type that is currently recoverable as both woods waste and factory waste would be to convert that wood in the form of shavings, wood fiber, or sawdust into insulation or hardboard, with or without the addition of binders. Those processes which operate without the added binder utilize the flow and binding properties of lignin at elevated temperatures and following suitable pretreatments. Where a binder is added it is necessary only to heat to the temperature of binder activation at the pressure required to produce the desired board dimension. It is hard to generalize on the various possibilities, but this is definitely a growing field for wood utilization.

Processes for hardboard production

The principal boards made without added binder are produced largely by the Masonite process or by way of Asplund defibration. The first utilizes steam at pressures up to 1000 lb./sq. in. for very short periods of time, thereby converting chips to pulped fiber. It may be likened to cooking wood with organic acids under high pressures and temperatures and short times. The second process utilizes the Asplund defibrator with simultaneous steaming and refining for a somewhat longer time than is employed in the Masonite process with or without a pretreatment. The wet boards in either case may be formed on a modified fourdrinier machine after sizing with rosin and wax emulsion. The wet sheets thus produced are cut to dimension and pressed at temperatures up to 200°C. and at pressures up to 500 to 700 lb./sq. in. Various boards prepared in this way have many uses—in home construction, home furnishings, and for many other industrial applications.

Wood without any chemical pretreatment whatever may be made into a hardboard through the incorporation of a satisfactory amount of binder. Many attempts have been made to use cheap binders and convert cheap wood waste and cheap binder into a product of wide utility and at a good economic advantage. By and large it may be said, however, that the successful operators today have gradually changed their ideas about binders; cheap adhesives have been replaced by expensive resins. As an illustration, let me refer to the Chapman process whereby urea-formaldehyde resin in combination with wood fiber is utilized for the production of a desirable hardboard. This Chapman process is worthy of a moment's consideration. It represents a retrogression from continuous machine-made operation back to the batch-made board. It seems to be feasible where limited amounts of wood wastes are available and where only a relatively small plant operation is possible. In this process a 1 per cent suspension of fibers and appropriate amounts of size and binder are formed into 4 x 8 ft. sheets in a deckle box. These sheets are pressed and heat-cured to make the final board. With these various conditions right and where an entry into a limited nearby market is possible, it would seem to be one way of converting wood waste into a good quality hardboard on a relatively small scale and at a competitive price. There are of course other operations of a related type.

The processes so far described for making board are based upon the formation of water-formed sheets. The other approach to this type of utilization of wood wastes is that of dry-forming boards in the presence of suitable resins, followed by hot-pressing the product to set the resin and achieve the desired dimension. The resins may be added as powders or as solutions; they may be mixed physically or sprayed into the fiber mass as it is being formed into a loose sheet. The resins used may be thermosetting or they may be thermoplastic. Either low-density insulation boards or high-density hardboards may be thus produced. As an illustration, the Novoply process developed in Switzerland appears to be a successful method for dry-forming board. The product will be used for interior paneling.

If the conversion of wood wastes to board is an established process, why not convert all of our wastes in this manner? The answer is in part that current hardboard production is almost enough to saturate the present markets for hardboard. Further markets would undoubtedly be established if we were able to make a board of improved qualities with respect to moisture stability, color stability, and one which can be made at lower costs for easier competition with other forms of construction.

In spite of all these drawbacks, hardboards are being produced at an increasing rate; they replace plywood and lath and plaster construction for walls and ceilings. They can be painted and papered. They are being continually improved, but further study is certainly needed in the matter of moisture stability, color stability, and cost.

One last reference to the conversion of wood waste into a densified product

concerns itself with the matter of briquetting. Many attempts have been made to briquette sawdust; almost the only successful process in the U.S. seems to have been the so-called Pres-to-log process used so extensively in the Pacific Northwest. Here the dry waste of the mill is first ground to appropriate size, and this is compressed in an automatic and continuously operating multi-die rotating unit to yield a log-like cylinder 12 in. long and 4 in. in diameter. Some 200,000 tons a year of Pres-to-logs are used annually in home heating plants, in fireplaces, and in dining car kitchens.

I have not attempted to cover the subject of hardboards in complete detail but confined the discussion to the general principle of the utilization of wood wastes in this general manner. There are certainly a number of other processes all having their advantages and disadvantages. For example, lignin has been successfully incorporated as a partial replacement for synthetic resins, and this board is made by the Howard Smith Paper Mills Ltd. of Cornwall, Ont., Canada.

Problems of waste utilization and handling

In passing, it should be noted that a vast amount of wood flour is used as a filler in molding powder plastics, for it imparts many desirable qualities to the finished product. As is so often the case, operations set up to consume a waste soon become of such major importance that they must continue producing the waste when it is no longer profitable to manufacture what was originally called the main product. This fact sometimes is the controlling consideration as a company thinks about getting into a waste utilization program and presents another obstacle in the way of the more complete utilization of wood.

In connection with the general question of the utilization of woods waste comes the question of how the waste material can be brought into the converting plant at a reasonable cost. Tree tops and odd-shaped logs are not easy to transport effectively. One answer has been to take the chipper out to the woods, for a chip truck always carries about the same weight of chips when it is full regardless of whether the chips came from a crooked tree top or a branch. Another device has been to set up small converting plants near the wood supply, but by and large it may be said that the cost of the wood from this particular type of waste material is somewhat greater than will be the cost of the wood as normally produced and delivered to the plant.

Bark utilization

Generally, it is said that 10 per cent of a tree is bark. This of course differs widely from species to species, birch bark being extremely thin, whereas the bark of the redwood tree, *Sequoia sempervirens,* measures up to a foot in thickness. Whatever be the case, there has been no general emphasis on the technical utilization of bark, nor have there been any very thorough fundamental studies of the nature of bark constituents, as has been done with wood. What work there is in the literature has not always been clear-cut because of the attempt to apply methods for wood analysis directly to the analysis of bark; the result is that into the literature there have crept misleading statements with reference to the amount and nature of bark constituents. One such has to do with the lignin content of the bark. As we know, Klason lignin represents that product which is isolated when we treat wood or a wood product with 72 per cent sulfuric acid followed by 3 per cent acid hydrolysis; the product occurs only by virtue of the definition. On the other hand, the material in wood which we call lignin has certain physical and chemical characteristics; it is a specific kind or class of material, identified roughly by its rather high methoxyl content and by its freedom from certain other groups such as carboxyl groups. The major part of the material, isolated as lignin from certain barks by the Klason method, has been shown to be almost completely free of methoxyl groups but to be relatively rich in carboxyl groups. Its chemical composition is considerably different from that of the lignin in wood. It therefore is not lignin and hence should not be called lignin. That does not mean necessarily that there is no lignin in bark, for in the so-called lignin fraction of the bark of the *Sequoia sempervirens* there can be isolated a very definite amount of material which closely resembles the lignin fraction from the same wood.

Not only do we not know the percentage composition of the majority of barks in terms of known wood chemicals and special constituents, but many barks of interest to us have never been investigated for their botanical constituents. The situation now is changing. As an illustration, the Fundamental Research Committee of the Technical Association of the Pulp and Paper Industry has in progress at the Forest Products Laboratory a rather extensive botanical study of the principal pulpwood barks. Chemists are also becoming interested in bark. Among these, Dr. Kurth at Oregon State College is making systematic studies of the chemical constituents of the barks of the Pacific Northwest. Dr. Purves and his students at McGill have been studying the chemical nature of the barks of eastern Canada. Wood chemists at The Institute of Paper Chemistry have been very much interested in barks; redwood bark in particular has been investigated in detail. Recently there was built by the Pacific Lumber Co. at Scotia, Calif., a small commercial plant to recover the bark acids and convert them into their various derivatives for industrial application; the fibrous constituent of the bark yields at the same time a pulp which is being made into a 2-in. low-density structural insulation board without the use of added resin, which is finding extensive use in the construction of low-temperature locker plants. Weyerhaeuser Timber Co. has been concerned with both the physical and chemical constituents of the barks of pulpwood species and has developed processes for their production and distribution under the name of Silvacones. Not long ago we received word from our friends in Stockholm that the Swedish Forest Products Laboratory was planning a listing of all the programs on bark research that they could obtain.

One of the problems therefore in the complete technical utilization of wood is certainly the utilization of the barks which are the by-products of the operations of our lumber mills and pulp mills. Such barks in large measure are currently either being burned in a wet or dry condition or are piled up on idle land. In times past, they found their way into rivers where, in water-logged condition, they sank to the bottom to decompose very slowly.

Control of insects and micro-organisms

There is another problem in connection with better wood utilization, namely, better control of insects and micro-organisms which are taking such a toll of our forests. Researches devoted to an improvement in the field of the technical utilization of wood certainly must concern themselves with the biological phases of our forest life. The new chemicals which are coming along may not prove to be an unmixed blessing; they may add to our problems, for there may develop more resistant strains of animal and plant life, able to step up the pace of the cold war which has existed for a long time between man and the lower forms of life. It has been estimated that in the United States in the course of a year insects and fire consume more wood than do all of the pulp mills of the country.

Reforestation and improved trees through genetics

Still another problem of specific interest to us as consumers of wood is one of improved reforestation. Our Swedish friends seem to have found the answer by putting in two small trees for every large tree they cut down. Their beautiful forests are a wonderful evidence of the way in which they have kept faith with Mother Nature. We also must emulate their example, and there is evidence that this is being done at least in some parts of North America. The problem is in part one of better education, educating the owners and operators of timberlands into accepting their responsibilities to future generations.

A third area with which our research departments should concern themselves has to do with determining how to grow trees faster, for certainly there is plenty of sunlight and chlorophyll to develop more of the products of photosynthesis than currently we utilize in the cambium. We hear stories in the United States about the fabulous hybrid willow trees being grown in Denmark. We have seen in some parts of the United States fast-growing hybrid poplars. We read occasionally about the hybrid pines being grown at Placerville, Cal. We have seen the results of hybridizing in our fruit trees, our flowers, our various annual crops and our animals, and now it is time we really began to apply some of the facts which have thus been developed to the real hybridizing of our trees. While we are at it, we might be able to grow trees which would have less lignin, more cellulose, more of the right kind of hemicelluloses, better fibers from the standpoint of their physical properties, and thus learn how to shape these natural products to our own needs and desires. While this is a long way off, sporadic and sketchy studies with cotton have already resulted in three varieties which provide better fibers for paper processing than do the varieties normally grown for textile purposes and at a cost which could provide serious competition for high-grade wood fibers.

New silicone treated papers

WITH THE INTRODUCTION into industry of the organic silicones, a new approach to the problem of release papers was conceived. A specific organic silicone, known as DC-1107 and manufactured by Dow Chemical Co., was found to present unusual repellent properties to many materials including the so-called class of sticky or tacky materials for which the paper industry had for years tried to develop repellent papers. Since the development of this silicone, a completely new approach to release papers was made available to the paper manufacturing and converting industries.

Several companies immediately launched substantial research programs in an attempt to utilize the properties of DC-1107 in the processing of a superior release paper. Among the companies that did basic development work, and now are producing a wide range of silicone release papers, was Minerva Wax Paper Co., Minerva, Ohio.

The DC-1107 treated papers are non-toxic and can be satisfactorily used in the food industries. In addition, the silicone coating provides a certain amount of water repellency to the paper which in some cases is desirable. The silicone treatment also provides a surface coating on the paper that is inert and completely resistant to heat well above the decomposition temperature of the paper (approx. 400° F.).

Applications and uses

Silicone treatment today is being applied to various kraft papers from 25-60 lbs. basis weight (24x36-500).

Glassine types of paper of 25 lbs. basis weight (24x36-500) and up are available for certain types of release work where a very high degree of surface smoothness and release are required. This type of product is of the tacky, pressure-sensitive coating class, such as adhesive tapes, etc.

Silicone treated papers are at the present time available in roll or sheet form in widths up to 50 in. The treatment can be obtained on one or both sides of a sheet.

Rubber Industry

In the rubber industry, which is the largest single potential market for silicone release papers, these papers are filling a long-needed requirement.

Specifically, the papers are being used for tacky types of rubbers where separation of the tacky rubber sheets is required for production purposes. The silicone treated sheets can be produced with treatment on one side or both sides and can be used as single layer or in the form of multiple layer separations. Because of the low cost of these papers, they can be used for one-time shipments and then discarded.

Steel Industry

Some use has been found for this paper in the steel industry, where pressure sensitive adhesives are used in combination with highly polished articles.

Protective papers are prepared by using silicone treated one-side krafts, and applying a pressure-sensitive adhesive to the other side in roll form. This is then unwound and the pressure-sensitive coated side applied to the polished steel part when needed. The silicone treatment prevents the pressure-sensitive adhesive from blocking in the roll form and allows for easy unwinding of the protective paper when required.

Food Industry

The uses for the silicone treated papers in the food industry are still being explored. They already have been found to be very satisfactory in specific industries such as the baking industry, where they are used for pan liners, cake liners, and cookie bake papers. For this use resistance to heat and release properties are a prime requisite.

Candy Industry

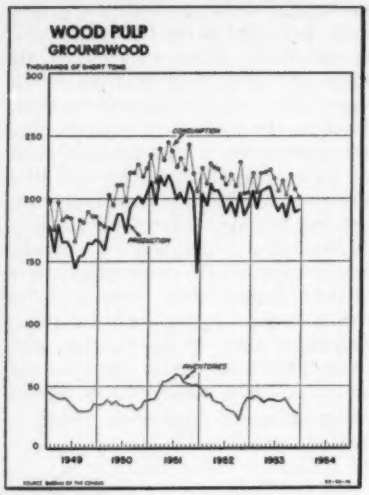
The candy industry is finding these papers very useful in papers where release of candies at temperatures of 160° F. and over are required, and where the release of sticky, tacky products has been a problem for years. In this industry the silicone sheets may be used over and over again, depending on how much care they receive in the manufacturing operation.

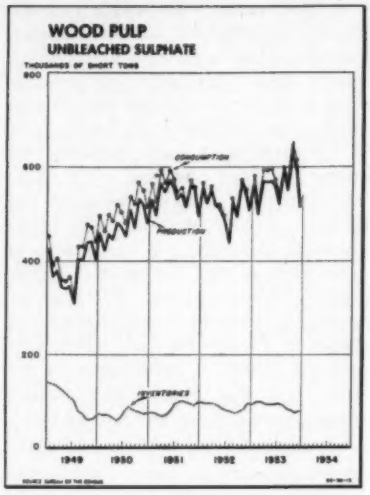
Container Industry

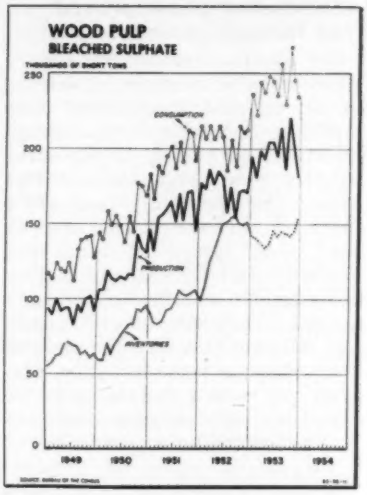
Considerable work has already been done in the container field. These papers are being used as inter-liners with excellent results, particularly where the containers are used for the packaging of waxes, resins, rubbers, asphalt, and adhesives.

Adhesives for silicone treated papers

Because of the unique properties of silicone treated papers it was necessary to provide the industry with special adhesives that would allow the laminating or adhesion of one film of silicone treated paper to another. This problem was tackled by Polymer Industry Inc., Astoria, Long Island, N.Y., and today there are adhesives that will permit adhesion between silicone surfaces to other silicone surfaces or of silicone surfaces to other paper surfaces or films.







New annual record in paper and board output

W. LeROY NEUBRECH
Department of Commerce

TOTAL APPARENT CONSUMPTION of paper and board in the United States in 1953 was approximately 31.4 million tons, exceeding any previous year by about 1.4 million tons. In 1951 and 1952 total annual consumption was approximately 30 million tons.

Taking 1953 production of 26.6 million tons and adding imports of 5.2 million tons results in a new supply available for distribution of 31.8 million tons. Subtracting United States exports in 1953 of about 400,000 tons leaves a balance of 31.4 million tons, which apparently went into actual consumption during the year. Available data on inventories of paper and paperboard seem to indicate that for 1953, as a whole, there was little change from beginning to year-end inventory.

Translating tonnage production figures of the pulp, paper, board and products industry for 1953 into value discloses a record-breaking output of $8,701 million. This compares with $7,979 million in 1952 and $8,477 million in 1951.

The year 1953 was marked by a continuation of the over-all capacity expansion of the industry, encouraged by the government's tax amortization program. There still remain a few important expansion projects under construction that for the major part are expected to come into operation sometime in 1954.

Expansion and streamlining of production facilities

Capacity expansions have been accompanied by general streamlining of production facilities, from logging operations through the woodyard, in paper and board mills and in converting installations. New manufacturing techniques and processes have been introduced in many mills, resulting in greater operating efficiencies, improvements in properties and quality, and an increasing diversity of products.

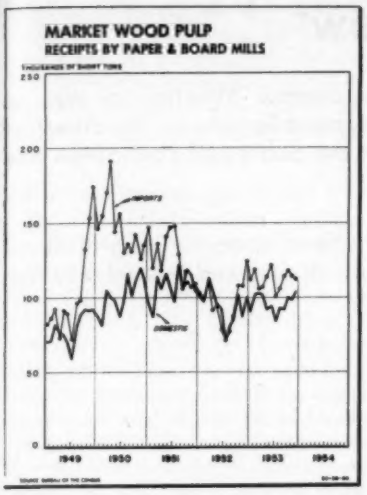
This trend toward modernization was also evident in the wholesale paper merchant's field, where new modern warehouses and mechanization for the handling of paper and products have been installed.

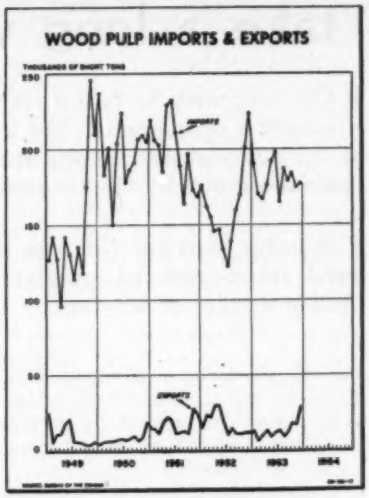
These various new developments in manufacturing and distribution facilities, equipment, and techniques have been extended to stepped-up marketing efforts. In many cases, larger budgets for advertising have been established for the year 1954. Sales departments are giving more intensive training to their salesmen and expecting them to be more active than in the past few years when paper was purchased rather than sold. Both mills and wholesale merchants are again offering improved services to their customers, and are willing to meet requests for special qualities or special orders in shorter periods of time.

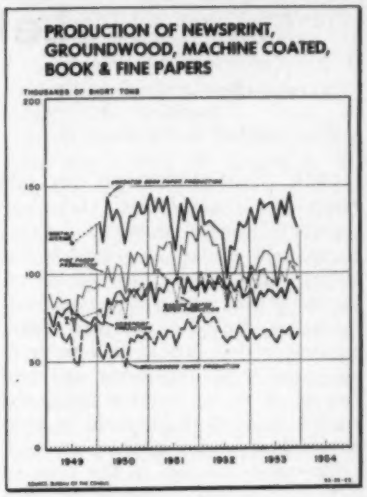
It is further apparent that with the increase in competition, more and more paper, paperboard, and converted products manufacturers are establishing separate market research departments in their companies. Such departments are not only analyzing new use or new product potentials, but are at the same time studying market trends by types of consuming outlets.

Additional interest is also being displayed in potential foreign markets for American pulp, paper, and paperboard. Substantial dissolving pulp capacity is being developed with a view toward meeting important foreign needs for this raw material, particularly in overseas production of rayon, acetate, transparent film, and other products.

*Condensed from the Annual Pulp, Paper and Board Review.







This past year a new Webb-Pomerene Corp. was established to incorporate the export interests of several important United States mills for kraft paper and products. Renewed activity is also evident by the two established export committees or associations representing the mills and the export merchants.

Distribution

The importance of wholesale paper merchants as a distribution branch of the industry must be properly recognized. Even though a large part of the industry's products are sold direct to converters, to manufacturers of other products, or to large printers, nevertheless in 1953 over $2,587 million of paper and products was handled by wholesale paper merchants throughout the United States. This would indicate that approximately 30 per cent of the total value of products produced by the industry travelled through the hands of wholesale paper merchants.

In the field of foreign trade, the industry is a major factor. Imports in 1953, especially of pulpwood, wood pulp, and newsprint, totalled $933 million, while exports of pulp, paper, and products amounted to $153 million.

Wood pulp

Trends in wood pulp production through 1953 disclose the rapid growth particularly evident to semi-chemical and defibrated exploded grades. It is in this field where a large quantity of hardwood pulpwood is being utilized. Also evident has been the rapid rise in the production of dissolving pulp, as well as the steady increase in sulfate pulps. Sulfite and soda pulp production has shown little change in recent years.

A substantial increase in wood pulp production capacity in the United States as well as in Canada in the last few years, together with a large new mill now under construction in Alaska, points to a lesser dependence upon overseas supplies of market wood pulp. In fact, some United States mills look toward a growing export market.

United States wood pulp inventories at the end of 1953 were considered satisfactory relative to consumption, being slightly below those at the end of 1952 but materially greater than those at the end of 1950 when a world shortage in pulp developed.

Waste paper

The year 1953 witnessed a much stronger demand for waste paper than existed in 1952. Yet, for the year as a whole, consumption was below the all-time peak of 1951.

The near capacity production of most grades of paperboard during practically all of 1953 accounted for the stronger demand for waste paper. The average price of waste paper on an index basis (1947-1949 = 100) rose from 61 in 1949 to 119 in 1950, and up to a peak of 188 in 1951. It slumped from that point down to 70 in 1952 and then returned to an average of about 91 in 1953.

Paper and board

Production in paper and board showed increases over 1952, and in many cases established all-time records. However, newsprint, groundwood papers, and fine papers showed moderate declines from the previous year. It is possible that, particularly in the fine paper field, the industry may have encountered a later inventory cycle than that in most other grades. It would appear that fine paper production in 1951 and 1952 might have been somewhat in excess of actual consumption with an accumulation of inventories which were in large measure used up in 1953. As a consequence, production in this grade group, as well as in probably most other grade groups, in the year 1954 should be relative to overall industrial and economic activity in the country.

The decline in domestic newsprint production in 1953, not withstanding a moderate increase in newsprint consumption, is accounted for by two or three small mills switching to other grades or ceasing operation. Domestic newsprint production in 1954 should show a material rise and probably establish a new high point for the past couple of decades. Two important domestic mills expect to place new capacity in operation during the year.

Newsprint supply and consumption in the United States is always an important consideration. A new peak of 6,086,000 tons of apparent total newsprint consumption was reached in 1953—a gain of 146,000, tons over 1952. A part of this consumption was drawn from stocks to the amount of 64,000 tons. Imports declined slightly to 5,004,000 tons, whereas United States exports of newsprint declined from 105,000 tons in 1952 to 47,000 tons in 1953.

Let's take a long view*

CRAWFORD H. GREENEWALT
President
E. I. du Pont de Nemours & Co.

▶ Our economy is based on abundance. Whether or not we will have a recession in 1954 will depend largely on the direction of the national psychology and on the degree of confidence and optimism shown by the consumer.

▶ Industry must keep its eye firmly fixed upon the long-term upward trend—toward greater productivity and abundance for the betterment of our lives.

OUR ECONOMY does not ride along in a straight line. Like any countryside, it has its hills and dales, its ups and downs. It would be far more constructive if, instead of trying to predict the precise shape of the hill or valley in the year ahead, business people would find ways to minimize these inevitable ups and downs so as to remove from the horizon both the high peaks of 1929 or the deep canyons of the early '30s.

Moreover, stability in the business cycle and industrial progress are completely incompatible. Stability by definition means leveling out or, to use a less pleasant word, stagnation, and it is doubtful whether there is any thoughtful businessman who would trade progress for stability, either for himself or for the American economy.

Our economy is based on abundance

We have in this country not an economy of necessity, but an economy of abundance. Our consumption of food, shelter, and clothing — all necessities of life — is predictable within reasonably narrow limits. Our consumption of automobiles, television sets, washing machines, and the other luxuries of an abundant life is in large measure unpredictable. For that depends not upon our desires, which are insatiable and endless. It depends simply on the average outlook of our people, whether they feel safe in increasing their consumption or whether they are fearful of their economic well-being.

A few centuries ago, people had few luxuries, and their preoccupation was mainly with keeping themselves fed, clothed, and sheltered. In those days depressions were influenced more by the weather and the effect on agriculture than by any other single factor.

In modern times, however, the causes of recession are much more nebulous, since they depend not upon natural phenomena but upon human decision. Whether or not we will have a recession in 1954 will depend largely upon the direction of the national psychology and on the decisions that are influenced less by rational economic reasoning than by simple confidence and optimism. Obviously, this involves great numbers of people, and the governing decisions will be made not only in business offices and board rooms but around the dining room table in millions of American homes. What we call "buying power" is in this country no arbitrary factor. For most of the things people buy are deferable. The purchase of that new automobile can be put off until next year. The current television set or washing machine or refrigerator can be tolerated a while longer. The new house doesn't have to be built. If people in the mass as consumers and as businessmen feel that they wish to defer a large percentage of their normal purchases, we will surely have a recession. If they are confident, willing, and able to satisfy their desires, we will have a boom.

No one has yet learned how to measure or how to influence people's confidence. A few things we do know. We know, for example, that a depression, once started, accumulates momentum like a snowball rolling down a hill, and that panic is a communicable disease far worse and far more rapid in its spread than any that affect us physically. It follows then that the business community must accept major responsibility for seeing that panic does not start. That it can do by maintaining its confidence high and its economic temperature as near normal as possible. In this atmosphere, the corrections that will be applied will be small and not in themselves frightening.

Today, for example, business inventories are said to be high, perhaps substantially higher than can be justified by present or expected sales volume. If business people should suddenly decide to correct that situation all at once, panic and depression would almost surely ensue. If, on the other hand, the correction is made in small increments over a reasonable period of time, the problem should be manageable and confidence maintained.

But above all else, industry must keep its eye firmly fixed upon the long-term upward trend — the amazing and dynamic industrial progress shown in this country over many years. For in the last analysis it is that upward thrust in inventiveness and productivity that is the sure and tested tool that puts an end to any depression whether it is major or minor.

Genius and inventiveness are always underrated

It is interesting to note that when anyone in the past has attempted to predict the long-term future, his forecast has turned out to be hopelessly shortsighted and pessimistic. Benjamin Franklin, for example, thought at the end of his life that it would perhaps take centuries to settle the American continent. Thomas Jefferson in announcing the Louisiana Purchase felt that the territory might be fully occupied after 25 generations.

The economist, Jevons, in 1860 was alarmed at the possible exhaustion of the earth's coal supply within a few years. Sir William Crookes, a distinguished scientist, saw early starvation of the race through diminishing supplies of nitrogen. What he did not foresee was that chemistry through nitrogen fixation would within a generation or so prove his error.

It is evident that the progress of genius and inventiveness is something that is always underrated. Those who become unduly alarmed at our short-term prospects are guilty simply of economic myopia. They forget that our economic orbit is shaped not by inventories, government spending or any of the host of business indicators but by human courage, desires, and incentive.

Genius and inventiveness are found among the people of every nation. They are not an American monoply. But the atmosphere of freedom in which we Americans live and work is unique among nations. It is in itself a creation of man's genius, an experiment born of dissatisfaction with the authority of the state, the guilds, a rigid social order, and all of the confining trappings of 18th century

*Condensed from an address presented at the Commonwealth Club of San Francisco, January 22, 1954.

Europe. Our experiment in government has succeeded beyond the fondest expectations of its founders, for not even they could foresee the effects of man's daring, vision, and creativeness set free to operate without let or hindrance.

Our horizons are unlimited

Today it is research that gives the American economy its characteristic surge and its dynamic qualities. And research requires people with the same courage, vision, and determination as those who a century ago crossed the western plains.

In the pioneering of the laboratory we encounter the same risks, the same disappointments, the same frustrations. Research today requires large organizations of technical specialists and elaborate facilities. It requires time, for the interval between the start of a research project and its successful conclusion becomes longer as scientific techniques grow more complex. And it requires enough financial confidence and patience to allow for the long succession of failures that accompany every commercial success.

There has been some talk in past years of the possibility that our economy is maturing, that we are reaching an industrial plateau from which we will progress only as our population increases. That point of view seems to me to be nonsense. For it is tantamount to saying that the last scientific barrier has been crossed, that there is no fruitful objective for further research, and that man's appetite for a more abundant life has been fulfilled.

On the contrary, in the 50 years or so during which we have practiced applied science, we have made only the smallest of forward strides, and the horizons before us are unlimited and extend far beyond our present vision.

Real security is abundance brought by enterprise

It is essential, as we make our way through the squalls and alarms of 1954, that we keep our eye on the main goal, which is the continuation of our progress to greater productivity, to greater abundance, to new products for the betterment and simplification of our lives.

This does not mean forsaking the search for what we call security. It does require us to know precisely what we mean when we define security as our goal.

In the early days of the last century, there was a kind of security in the well-established settlements of our Eastern seacoast. The pioneers who journeyed westward across harsh and inhospitable country were not unmindful of the blessings and comforts they had left behind. But they perceived that, in the long view, a greater security was to be found in the enterprise that led them west. And today, in accepting the risks and hazards implicit in industrial progress, we reach for the only real security — the abundance that enterprise will bring.

We must not accept a definition of security that merely preserves the *status quo*, for that will lead to stagnation and something like the dark ages of medieval history — that was a depression that lasted over 800 years.

If we are to avoid it, we must keep alive that spirit of confidence and optimistic venture that has been so fruitful in the past.

Centrifugal Pumps

Pump troubles—mechanical

Part 31 of a series

IGOR J. KARASSIK and ROY CARTER
Application Engineers, Worthington Corp.

▶ The material published in this series of articles, concluded in this issue, will form the subject of a book at some future date. I. J. Karassik and Roy Carter are also co-authors of "Pump Questions and Answers," published by McGraw-Hill Book Co., Inc.

OBVIOUSLY, THE PRESENCE of foreign matter in the impeller or casing of centrifugal pumps can lead to serious trouble and should be carefully prevented unless the pumps are specially designed to handle such material.

Strainers or screens should always be located in the suction line if the presence of such foreign matter is suspected. Even when under normal operation the presence of foreign matter is unlikely — as, for instance, in the case of boiler feed pumps — welding beads, bolts, nuts and other similar extraneous objects may find their way into the pump suction in the early stages of operation. Temporary screens or strainers should therefore be used in all pump installations. After the pump has been in successful operation for a period of time, the screens may be removed.

If the suction eye of one side of a double suction impeller becomes completely clogged, it will reduce the pump capacity approximately by one-half. A complete blocking of one side would not impose an excessive load on the thrust bearings, as there will exist little difference in pressure on the two eye areas. A partial blockage of one or both sides, however, often results in throwing the rotor out of balance and may impose an additional load on the bearings.

Misalignment and damage to internal parts

Misalignment difficulties should never be permitted to take place, and there is absolutely no excuse for not following the explicit instructions provided by the pump manufacturer. Besides its obvious effects on the

pump bearings, serious misalignment will frequently interfere with the proper functioning of the stuffing boxes and impose a severe stress on the shaft, leading to occasional failure of the latter through fatigue.

While in some cases, a pump may develop mechanical troubles on first being started up due to causes such as rubbing of rotating parts, bent shaft, damaged internal parts, defective casing gaskets, rotor out of balance and the like, such cases are exceedingly rare. Most of these accidental failures would be discovered prior to shipment during the test at the manufacturer's plant. They can, however, take place after a pump is dismantled and reconditioned in the field. This should not be construed as a criticism of the maintenance personnel in general, but rather as a recognition of the fact that personnel which engages in such maintenance work at infrequent intervals cannot be expected to be as familiar with the necessary operations and precautions as the workmen engaged in the same work day in and day out.

Probably first on the list of the difficulties which may occur in field reassembly of rotors is the negligence of the precautions necessary to prevent contact between the rotating and the stationary parts. Starting up a pump which has not first been thoroughly checked for the concentricity of the rotating element with the stationary parts may easily lead to a damaged or even seized rotor, especially if the pump is stainless steel fitted, as such materials gall easily on making contact.

Another practice which may, under some conditions, cause the binding of a rotor in its internal clearances, is the starting up of a pump which handles high-temperature liquids without first warming it up thoroughly, running it at a very reduced speed (say ½ or ¼ of normal) a number of times and letting it run down to several stops by cutting the power off. The reason for the pump seizing in such a case is that if any internal parts are rubbing even very slightly, heat is generated and when the pump is not up to speed, there is not enough liquid going past the internal clearances to keep the contacting elements cooled. When the power is cut off at that moment, the rotor will lock solidly in the wearing rings when rolling to a stop. As a result, it is recommended that, when a pump, is started up cold or only partly warmed up, the unit should be brought up to full operating If, through faulty internal alignment, speed and kept going by all means. a momentary contact does take place, the chances are that the pump will not seize, assuming that the contact is slight.

If the axial contacting faces of impeller hubs, shaft sleeves and shaft nuts are not 100 per cent perpendicular to the bores of these parts — such 100 per cent alignment is difficult to attain in the field without very accurate machining facilities — excessive tightening up of the shaft nuts will lead to bending of the shaft and potential contact of the rotating parts. For this reason, a reassembled rotor should always be checked for concentricity and true running before being inserted into a pump casing.

Packing troubles

Stuffing box packing troubles fall into that category of difficulties which most frequently beset a centrifugal pump. Some of the factors in the condition and operation of a pump which may contribute to stuffing box difficulties are:

(1) Shaft running off center, due to excessive wear in the bearings, to a bent shaft or to misalignment. This condition can be readily checked first by disconnecting the coupling and rechecking the alignment and secondly by mounting an indicator on the pump casing in the vicinity of the stuffing box and determining whether the shaft revolves concentrically.

(2) Shaft or shaft sleeves worn and scored at the packing. A routine examination of these parts will determine when they must be renewed or repaired.

(3) Shaft vibration due to unbalance of the rotor, cavitation, or operation at extremely light flows or beyond the recommended maximum or to instability in parallel operation.

(4) Plugging up of the water seal connections or improper location of the seal, so that no sealing liquid is allowed to enter the stuffing box. Likewise, the presence of dirt or grit in the sealing liquid will cause stuffing box difficulties through scoring the shaft or shaft sleeves.

(5) Excessive tightening of the gland with resulting absence of leakage to lubricate the packing. Hourly and daily observation of the pump operation, coupled with the knowledge that some leakage is necessary for proper stuffing box operation will avoid troubles from this cause.

(6) Failure to provide suitable cooling through water-cooled stuffing boxes if the pump is so fitted.

(7) Excessive clearance between the bottom of the stuffing box and the shaft or shaft sleeve, causing the packing to be gradually pushed into the pump interior. Such a condition can arise from repairs made to shaft or shaft sleeves by grinding them down excessively instead of replacing them or building them up to original dimensions.

(8) Packing not properly selected for pressure, temperature or rubbing speed conditions.

(9) Packing not properly inserted into the stuffing box, as for instance if the individual rings are too short and the gap between ring ends is excessive or if the ring joints are not staggered.

Bearing troubles

Bearing troubles are probably as frequent in their incidence in centrifugal pump installations as packing and shaft sleeve difficulties. The list of contributory causes is a relatively lengthy one and should be thoroughly analyzed if bearing replacement becomes a repetitive process:

(1) Excessive radial or thrust load caused by some mechanical failure inside the pump or by failure of a hydraulic thrust balancing device if such is used.

(2) Excessive amount of grease or oil in the housing of an antifriction bearing will cause overheating and failure of the bearing.

(3) Excessive heating of the bearing may be due to improper dissipation of heat or to a failure of the cooling medium supply.

(4) Lack of lubrication.

(5) Dirt or foreign matter in the lubricant.

(6) Improper installation of antifriction bearings (damage during assembly, incorrect assembly of stacked bearings, use of unmatched bearings as pairs, etc.)

(7) Rusting of anti-friction bearings due to water getting into the bearing housing.

(8) Excessive cooling of water-cooled bearings, resulting in condensation of atmospheric moisture in the bearing housing.

(9) Last, but by far not least, misalignment of the unit, bent shaft or severe vibration, imposing excessive loads on the bearings.

One of the most insidious and most costly of the troubles which may affect centrifugal pumps is the failure of the materials used in the construction of the pump to withstand the corrosive or erosive properties of the liquids handled. Unfortunately, this problem is of an extremely involved nature and cannot be treated extensively in an article of this character.

Filtration through paper

ROBERT INGALLS and OLIVER AXTELL

Condensed by D. S. Davis
Department of Chemical Engineering
Virginia Polytechnic Institute

THE OBJECT OF THIS investigation was to study the effect of techniques of manufacture on the characteristics of experimental paper filters similar to those intended for military and industrial purposes. Such characteristics are pressure drop, penetration, filtration efficiency, and tensile strength.

Procedure for preparing experimental filters

Fifty grams of hardwood soda pulp from the Penobscot Chemical Fibre Co. of Great Works, Maine, were beaten in a TAPPI standard beater, without load on the bedplate, at 0.6 per cent consistency and at 20° C. for periods of 15, 30, 60, and 90 minutes. Handsheets of constant apparent density were made on a TAPPI standard (205 m-45) sheet machine with a 150-mesh wire from stock diluted to 0.5 per cent consistency so that the dried weights of the finished sheets were 2.2 grams.

The investigation included a study of characteristics of filters made from (1) whole pulp that had not been treated after beating, (2) whole pulp that had been dried after beating, redispersed in water, and made into sheets, and (3) whole pulp that had been divided into three parts, which had been beaten, respectively, for 15, 45, and 90 minutes, after which each part was classified for four hours in an Appleton selective screen. Of such pulp, fractions that were retained on 50, 90, and 200-mesh screens were drained, dried, redispersed in water, and then made into sheets.

Testing methods

The filtration efficiency, γ, of the experimental filters was computed by means of the equation

$$\gamma = \frac{100 \log (100/T)}{\Delta p}$$

where T = penetration, percentage of smoke (liquid particles of dioctyl phthalate of 0.3μ in diameter at a particle concentration of 100 mg./liter of air) which passes through 100 sq. cm. of handsheet at an air flow rate of 32 liters per minute, measured at one atmosphere and 70° F.

and Δp = drop in air pressure, millimeters of water, across 100 sq. cm. of handsheet at a flow rate of 85 liters of air per minute, measured at one atmosphere and 70° F.

Determinations of tensile strength were made on strips of the handsheets by means of a Scott Model X-5 tensile tester, with a scale range of 5 pounds per inch, operated in a room held at 73° F. and 30 per cent relative humidity.

Effect of beating time on sheets made from whole pulp

Characteristics were determined for experimental filters made from whole pulp that (1) had not been treated after beating, and (2) had been dried, redispersed, and remade into sheets.

Stock untreated after beating. Plots show that as beating time increased from 15 to 90 minutes, (1) pressure drop increased linearly from 66 to 108 mm. of water, (2) penetration remained constant at 50 per cent, (3) filtration efficiency decreased linearly from 0.42 to 0.28, and (4) tensile strength increased from 4 to 6.6 pounds per inch along an asymptotic curve.

Stock dried, redispersed, and remade into sheets. Similar plots show that (1) the pressure drop remained constant at 50 mm. of water, (2) penetration maintained a level of 60 per cent, (3) filtration efficiency remained constant at 0.48, and (4) tensile strength held constant, within the experimental error, at 2.5 pounds per inch.

Effect of beating time on sheets made from pulp fractions

For filters made from pulp fractions where the stock had been dried, redispersed in water, and remade into sheets, plots show that, regardless of beating time, the pressure drop for 50-90-mesh fractions remained at 27 mm. of water, penetration held constant at 72 per cent, filtration efficiency was 0.53, and the tensile strength was 1 pound per inch. Sheets made from large fibers exhibited lower tensile strengths and higher filtration efficiencies than did those made from small fibers. Pressure drop and penetration of sheets made from pulp fractions were comparable to those made from whole pulp, but the converse was true for tensile strength.

Conclusions

At constant apparent density, (1) for stock untreated after beating, increasing the beating time increased the pressure drop and tensile strength, had no effect upon penetration, and decreased filtration efficiency, (2) for stock dried after beating, redispersed, and remade into sheets, increasing beating time had no effect upon pressure drop, filtration efficiency, and tensile strength, whether or not the sheets were made from whole pulp or from fractions of whole pulp, and (3) for stock dried after beating, sheets made from pulp fractions composed of small fibers exhibited higher pressure drops and tensile strengths but lower penetrations than did sheets made from pulp fractions composed of large fibers. Filtration efficiencies were higher for sheets made from large fibers than were those for sheets made from small fibers.

Original paper appeared in TAPPI, *36* (11) 509 (1953).

Paper mill noise reduces efficiency

DR. W. SCHWEISHEIMER

Noise lowers all faculties, dulls mental processes, and makes people irritable and pessimistic.

THE EFFECTS OF INDUSTRIAL NOISE in terms of fatigue and inefficiency has long been underestimated. In some plants and mills, machine noises have been quieted, and this fact alone increased production capacity approximately 9 per cent.

No one minds his own noise, says R. Allen Wilson of Celotex Corp. It's the other fellow's noise that is annoying. Intermittent noise is worse than continuous sound. He estimated the cost of noise in business at $4,000,000 a day.

Dr. C. O. Sappington found that in an assembly department of a manufacturing company which was moved from next to a noisy boiler shop to a quiet location, rejections were lowered from 75 to 7 per cent. An increased output resulted, changing from 88 to 118 units in the same period of time.

Another noise expert, Howard C. Hardy, quoted experiments showing that reduction in noise has resulted in efficiency increase up to 9 per cent; reduction of errors, 30 to 50 per cent; reduction in absenteeism and employee turnover, up to 50 per cent.

In noisy environment it is necessary to concentrate harder to accomplish the same amount of work. This strain on nervous tension and attention causes fatigue. Women are particularly affected by such influence. Noise is a major factor in excessive labor turnover in industry.

Noise meters

Nowadays we can measure the loudness of noises and express the results in figures. This is done by noise meters (sound level meters) and audiometers; the loudness is recorded in decibels or phons. If we take the average loudness of a conversational voice as about 50 decibels, a whisper at a distance of 5 ft. measure about 10 decibels.

On the other hand, the noise of a pneumatic drill in the street rises to 90 decibels, somewhat more than in a paper mill or in a large typists office. The noise in the average busy street is 60 decibels.

The rustle of leaves in a gentle breeze rates a noise of 10 decibels, and this is the lowest threshold where noise can be heard. The upper limit is 130 decibels, where sounds begin to be painful to the ear. The range of speech, in normal conversation, lies between 35 and 65 decibels.

Noise reduction

The first principle of noise reduction, according to M. A. Smith, accoustical engineer, is: Don't make it!

Machine designers should consider the noises their creation produces. Machinery offends in two ways. (1) The noise it produces is heard within the room and is enhanced by reverberation. Noise absorption in a room can be increased by use of absorptive material. (2) Vibrations of the machine may convert the floor into a veritable loudspeaker. Vibrations produced in floors are commonly transmitted to the entire structure and may be heard several floors away.

One method of eliminating this noise is to use a properly designed resilient base, which should be "hand tailored" to suit the weight of the machine, the position of its center of gravity and the frequency of the imposed vibration.

It is not always the actual noise source that is the offender. Sometimes a machine acts like the sound box on a violin, amplifying the motor noise. In such cases, Dr. Hardy points out, the quieting job can be done simply by isolating the motor or gear noise from the rest of the machine.

Noise costs money. This fact first became apparent when claims were made for compensation for hearing loss from working in areas of high noise level. The fact that noisy surroundings reduce efficiency has received less attention.

Noise reduction may be accomplished by replacing worn parts; using well-balanced parts; mounting machinery that will not vibrate; keeping moving parts well oiled; direct or belt drive in place of open gears, using non-metallic gears; mounting machinery on bases.

Screening the workers

Besides making the mill quieter, there is the other way to screen the workers with the idea of putting those with particularly noise-susceptible ears in quiet parts of the mill.

The American Academy of Ophthalmology and Otolaryngology recommends that an industrial company go through the following three steps in its screening process of its workers:

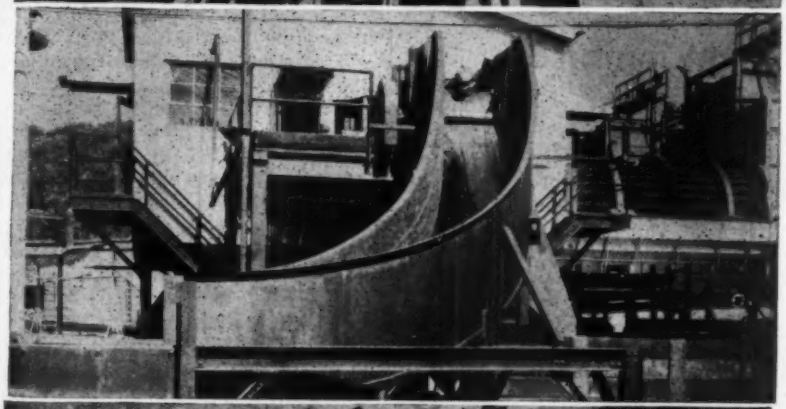
1. Determine the noise levels in all parts of the mill.

2. Give pre-employment hearing tests to all workers who are to be stationed in areas where the noise level is over 90 decibels. Give follow-up tests regularly every month or two.

3. If a worker has noise-susceptible ears, transfer him to a quieter job and make him wear ear protectors. The latter is recommended, although many workers will say: "Why? — I can take it."

Good types of ear protectors, properly fitted, may reduce loudness of noises as much as 8 per cent at certain levels. Many workers do not like the idea of introducing anything into their ears. But even a 5 or 10 decibel reduction is important when we are just treading on the borderline of discomfort.

Belt conveyors in pulpwood handling*



The illustrations show (1) the 900-ft. belt conveyor, (2) the loading chute which causes the bolts to make a 90° turn, and (3) the bolts rolling onto the belt without appreciable impact

F. D. WHITEHEAD
Superintendent of Maintenance
West Virginia Pulp & Paper Co.
Covington, Va.

The Covington mill of West Virginia Pulp & Paper Co. in 1951 completed the second installation in this country of a belt conveyor for pulpwood handling. It is a 36-in. belt conveyor. A 50 hp constant speed motor, driving through a fluid coupling at a linear speed of 300 fpm, made up the drive as originally designed and installed.

Bolts of pulpwood, 5-ft. in length, are loaded on the feed end of the belt at the barking drums. A specially-designed chute delivers the wood by gravity onto the moving belt. The logs are then elevated 45 ft. over a distance of 834 ft. before discharging directly into the mouth of a chipper.

Originally, the top belt was supported at the loading point by 6-in. diameter rubber impact idlers. These idlers were spaced on 4 ft. centers.

Six-in. diameter steel idlers on 3-ft. centers are used to support the belt between the loading point and point of discharge. Excessive sag between idlers is prevented and slippage on the drive pulley is minimized by the use of a gravity pulley. This pulley is installed on the return side of the belt. Attached to the pulley is a 4000-lb. weight.

The belt is of the best quality. Features include a transverse cord breakerstrip, six plies of 32-oz. duck, a ¼-in. top cover, and a 1/16-in. bottom cover. The total length of the belt is approximately 1700 ft.

The design of the loading chute is unique. The wood bolts make a 90-degree turn while sliding down the chute and roll onto the belt from the side. Side loading is probably the most important feature of the chute. It causes the wood to roll onto the belt without appreciable impact or sliding motion. A small water spray is used on the chute to reduce friction.

Some mechanical and operational difficulties showed up after the con-

*From a paper presented at the APPMSA convention in June, 1953.

veyor had been in service for a time. The majority of the difficulties were of a minor nature.

Operating difficulties overcome

The first problem that faced us was the frequent breaking of idler shafts and bearings. This difficulty was caused by the hammering and bouncing action of the pulpwood as it moved over the idlers. The solution to this problem was simple. Alternate idlers were removed to provide a hammock 6 ft. in length to accommodate the 5-ft. wood.

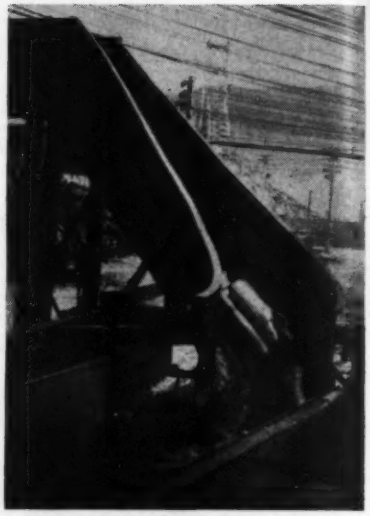
The second modification which we felt desirable was the installation of a variable speed drive. This drive keeps the supply of wood handled in step with chipper operation without frequent stopping and starting.

During the two years operation of the conveyor, the belt has suffered carcass rupture on two occasions. In each case, the damaged sections of the belt were removed; the undamaged ends were vulcanized together; the result was a belt as good as new. Such a repair job required a down-time of approximately 10 hours.

Stretching of the belt was of some concern during the early days of operation. This problem was easily overcome. It was necessary only to move the tailshaft back as the belt stretched. Also, when sections of the belt were removed because of carcass rupture, the belt was shortened sufficiently to take care of stretch, and to allow the tail shaft to be moved back to its original position.

A definite schedule has been established for lubricating all conveyor bearings and wearing surfaces. The plain bearings and gravity take-up slides are lubricated twice weekly. The idler bearings are of the anti-friction type; they are lubricated on a three-month schedule. No bearings have been lost because of insufficient lubrication.

The operating and maintenance personnel at the Covington mill believe that the decision to use a belt conveyor for handling pulpwood was a good one. It has paid off through continuity of operation and extremely low maintenance costs.



Another view of the loading chute

Film forming corrosion inhibitors

(Continued from page 50)

Book paper mill. Six fourdrinier machines at this mill produced 220 tons of fine paper daily. Accurate records are maintained on dryer steam requirements. One machine was selected for use to evaluate the effectiveness of Permacol. Prior to the use of Permacol, steam requirements averaged 3.2 - 3.5 pounds steam per pound of paper. Following the feed of Permacol, average steam requirements were reduced to the range of 2.8 - 2.9 pounds steam per pound of paper 1/M a reduction of 15 per cent.

At this plant, a savings of $10.00 per day is secured with a reduction of 0.1 pound steam per pound of paper and a total savings of $50.00 per day results from extending the use of Permacol to all six machines.

Kraft paper mill. Two machines at this mill produce kraft. On the older machine, dryer pressure was limited to 50 psi by the state inspector. A relief valve set at 48 psi was blowing frequently as steam pressure was maintained close to the maximum in an attempt to secure better drying. Upon application of Permacol to the steam, it was faund possible to reduce dryer steam pressure to a constant value of 35 psi and to secure the desired drying. This machine operates at 250-350 ft. per minute and, due to other mechanical factors, no attempt was made to increase machine speed.

The reduction possible in dryer steam pressure indicates an increase of approximately 21° F. in outer surface temperature.

Aside from the improvement secured in drying efficiency, a severe return line corrosion problem was eliminated after application of Permacol to the entire plant steam production. Prior to the use of Permacol, some return line sections had been replaced after only three months' service. Brass lines also failed due to dezincification. A steel condensate receiver required frequent welding to patch leaks. Application of Permacol to the system eliminated these corrosion difficulties and test specimen data showed over 99 per cent reduction in the corrosion rate.

Book paper mill. At this mill five fourdrinier machines are employed producing 150-175 tons of fine quality book paper daily. To test the effectiveness of Permacol in promoting dropwise condensation, arrangements were made to feed the filming amine to the steam to only one machine. After approximately four weeks time it was found possible to increase the machine speed from 2-5 per cent compared to the condition before treatment. Arrangements are planned to extend the use of the filming amine to all five machines.

Prior to the use of Permacol, test specimen data showed a corrosion rate of 0.0563 in. per year average penetration. With the use of Permacol, test specimens exposed in the return system have shown the average penetration rate reduced to 0.0045 in. per year 1/M a reduction of 92 per cent in the corrosion rate.

The application of the filming amines to paper mills for the express purpose of improving dryer operation has shown that definite benefits can be secured. The many variables make it difficult to predict to what extent dryer operation will be improved in any individual plant. Actual plant trials are required, but from results reported to date, the improvement in dryer efficiency through the feed of a filming amine should be between 5-10 per cent.

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Until *the outbreak* of the **REVOLUTIONARY WAR,** all paper used in making money for all the Colonies from Massachusetts to Carolina was produced, it is said, by Pennsylvania's Ivy Mills . . .

Various kraft and glassine types of paper are being treated with an organic silicone to make them repellent. They are finding wide use in the rubber, steel, food and candy industries as release papers for tacky or sticky products; they withstand temperatures from 160° to 400° F.

When new, the **PAPYRUS** sheets turned out by the Ancient Egyptians were usually *white* in color . . .

Odd Bits

LARGE QUANTITIES OF PAPER and VELLUM were bought, it seems, to feed the six presses said to have been used in producing the 42-line Bible in **1456**..

The Paper Industry Allied News

NEW WEST COAST plant of Hanchett Mfg. Co. located at Portland, Ore.; Hanchett, which is the world's largest manufacturer of all types of saw sharpening and knife grinding machines and accessories, has main offices at Big Rapids, Mich.

Edgar Bros. and Attapulgus Merger Plans Announced

Attapulgus Minerals & Chemicals Corp. and Edgar Bros. Co. have announced that a basis of merger of the two firms has been agreed upon, subject to approval by the boards of directors and stockholders. The report was issued by Wright W. Gary, president of Attapulgus, and James Deshler, president of Edgar Bros. The name of the merged company is to be American Minerals & Chemicals Corp.

Attapulgus is the largest producer in this country of fullers earth used widely in the chemical, petroleum, and other industries. Its mines and processing plant are located in Georgia. The firm also owns important patented processes for the concentration of mineral ores, particularly phosphate and potash, which it licenses to others.

Edgar Bros. is the oldest and one of the largest integrated producers of kaolin, a basic raw material used in the production of high-grade papers, wallpapers and paperboard. The firm owns extensive kaolin deposits, operates two mines, five processing plants and research laboratories in Georgia. Executive offices are at Metuchen, N. J.

Mr. Deshler will be president of the merged company, while Mr. Gary will be president.

Allied News Notes

J. O. Ross Engineering Corp. announces the launching of a sizable expansion program throughout the United States and Canada. Work has started on the construction of a new plant in Los Angeles. In Canada, an addition is being built at the Montreal plant of Ross Engineering of Canada. . . .**Samuel Moore & Co.** of Mantua, Ohio, producer of Dekoron coated instrument tubing and Impervapak instrument line harness, has announced that Dekoron Tubing Div.—which handles sales of these items—will henceforth be known as Dekoron Products Div.

Allied Personalities

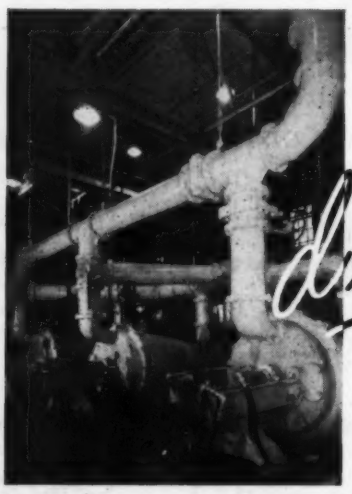
S. B. Huss

L. G. Janett

Stanley B. Huss has joined the staff of Wisconsin Wire Works and will represent the firm in New York, Pennsylvania, Maryland, Delaware, New Jersey, Connecticut, Rhode Island, and Massachusetts. He was formerly with E. W. Twitchell Inc. . . .**L. G. Janett** of Chicago was recently elected a vice president of J. O. Ross Engineering Corp. and manager of the Chicago office. A member of the firm since 1935, he is a graduate chemical engineer. . . .**R. F. Welter** has joined the New York Direct Sales Group of Antara Chemicals, sales division of General Aniline & Film Corp. He will assist in the sales program for chemical intermediates and carbonyl iron powder.

Tom Cook has been named to succeed his father as sales representative in the Texas-Oklahoma area for Graton & Knight Co., leather products manufacturer. . . .The Pusey & Jones Corp. of Wilmington, Del., has appointed Daniel M. Pierce as works manager.

F. C. Huyck & Sons of Rensselaer,



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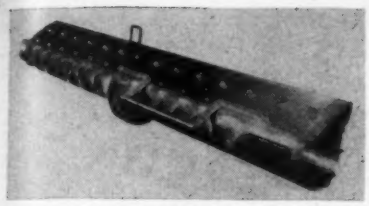
Let dependable, efficient and economical MPC Wood-Lined Steel Pipe answer your problems of corrosion, abrasion, frictional resistance or sliming. Specify MPC Wood-Lined Steel Pipe, the pipe that combines the strength of steel with the durability of wood!

Piping and fittings are available in standard sizes or to your special requirements. For additional information, write Applications Engineering Dept. PI.

MICHIGAN PIPE COMPANY / Bay City, Michigan



RECENT AGREEMENT provides for the sale of the patented S. D. Warren air doctor through the Dilts Machine Works Div. of the Black-Clawson Co.; Dilts will include the air doctor as an integral part of complete coating installations; the equipment has been widely accepted for clay and emulsion operations

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N. Y., has promoted three former sales representatives to positions as district managers. They are **Frank P. Knack**, Midwest; **Alan R. Boyd**, Middle-Atlantic, and **W. D. Stroud**, New England. . . . Everett C. Reed has been named assistant vice president of Albany Felt Co. He joined the firm in 1930 and previous to his recent promotion was plant manager of the Albany mill.

C. W. Guischard

E. E. Esgate

J. O. Ross Engineering Corp. has appointed Charles W. Guischard to handle engineering and sales of pulp and paper mill machinery in Pennsylvania. . . . E. E. Esgate has been elected a vice president of **The Thew Shovel Co.** of Lorain, Ohio. . . . Robert S. Shrader of Seattle has been named factory representative for **Yarnall-Waring Co.** in Washington, Oregon, and northern Idaho. . . .

Oldbury Electro-Chemical Co. has appointed **Harry R. Oswald** plant manager and **Marshall W. Mead** production superintendent of the new sodium chlorate plant at Columbus, Miss.; the plant is expected to be in operation in April. . . . **C. Barry Neill Jr.** of Decatur, Ga., has been made sales representative of the William Powell Co. for Powell valves; he was formerly with Taylor Forge & Pipe Works. . . . Industrial Ovens Inc. of Cleveland has announced the following personnel changes: **Howard R. Richards**, president and general manager; **Sloane E. Allen**, vice president and treasurer; **Louis A. Litzler**, secretary.

10
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The Paper Industry Association News

LAST OF THE 1953 Fred C. Boyce Student Awards was presented to Lewis Silliman (r), a student at the New York State College of Forestry, at a program at the school in February; participating in the program were (l to r) Fred W. O'Neil, professor of pulp and paper technology; Harry E. Weston, secretary and treasurer of the Superintendents, and Dr. Hardy L. Shirley, college dean

Laboratory and Pilot Plant Techniques to be Feature at TAPPI Coating Meeting

TAPPI's Fifth Annual Coating Conference will be held May 24-26 at the Poland Spring House, Poland Spring, Maine. The conference committee selected the location because of its proximity to leading New England paper coating mills.

Important features of the meeting will be a symposium on laboratory and pilot plant development techniques for paper coaters and mill visits to plants in the area.

Three mills have invited TAPPI members to tour their coating operations during the three-day gathering. They are S. D. Warren Co., Cumberland Mills, Maine; Oxford Paper Co., Rumford, and St. Regis Paper Co., Bucksport.

A highlight of the meeting will be an address Rex W. Hovey, executive vice president of Oxford Paper, at the dinner meeting May 25. Being planned are exhibits of equipment and instruments pertaining to operation, control, testing and research in the paper coating field.

Plastic Piping Applications for Paper Mills Recommended at Michigan Supts. Meeting

In its proper fields of application, plastic piping is superior to and more economical than metal pipe. This view was expressed at a recent meeting of the Michigan Division of the Superintendents Association by R. W. Bender of the Chicago Die Mold Div. of United States Rubber Co. The gathering was held at the Hotel Harris, Kalamazoo.

Mr. Bender declared that roughly 70 per cent of the plastic pipe sold is polyethylene; that butyrate currently ranks second in usage; that Saran is the oldest plastic pipe and was the first to gain acceptance in the handling of corrosive chemicals; that the so-called rigid vinyl pipe is the latest addition to the plastics pipe family; that polyester fiberglass pipe was developed largely under Navy contracts during World War II, and that Uscolite pipe was introduced commercially in 1948.

According to the speaker, Uscolite piping will handle any chemical used in paper mills (to the best of his knowledge) provided pressures and temperatures are not too high. Depending on pipe sizes, he said that Uscolite is not intended to handle solutions above 170°F. nor pressures above 100-150 psi.

Various applications

The best known applications of Uscolite pipe cover the handling of air, alum, bleaches, brines, chlorine dioxide bleach, chlorine gas and water, demineralized water for boiler feed and electrical grade papers, filler dispersion, piping through bleach room (external corrosion), soluble sizing (glue-starch) and wet strength resin solutions.

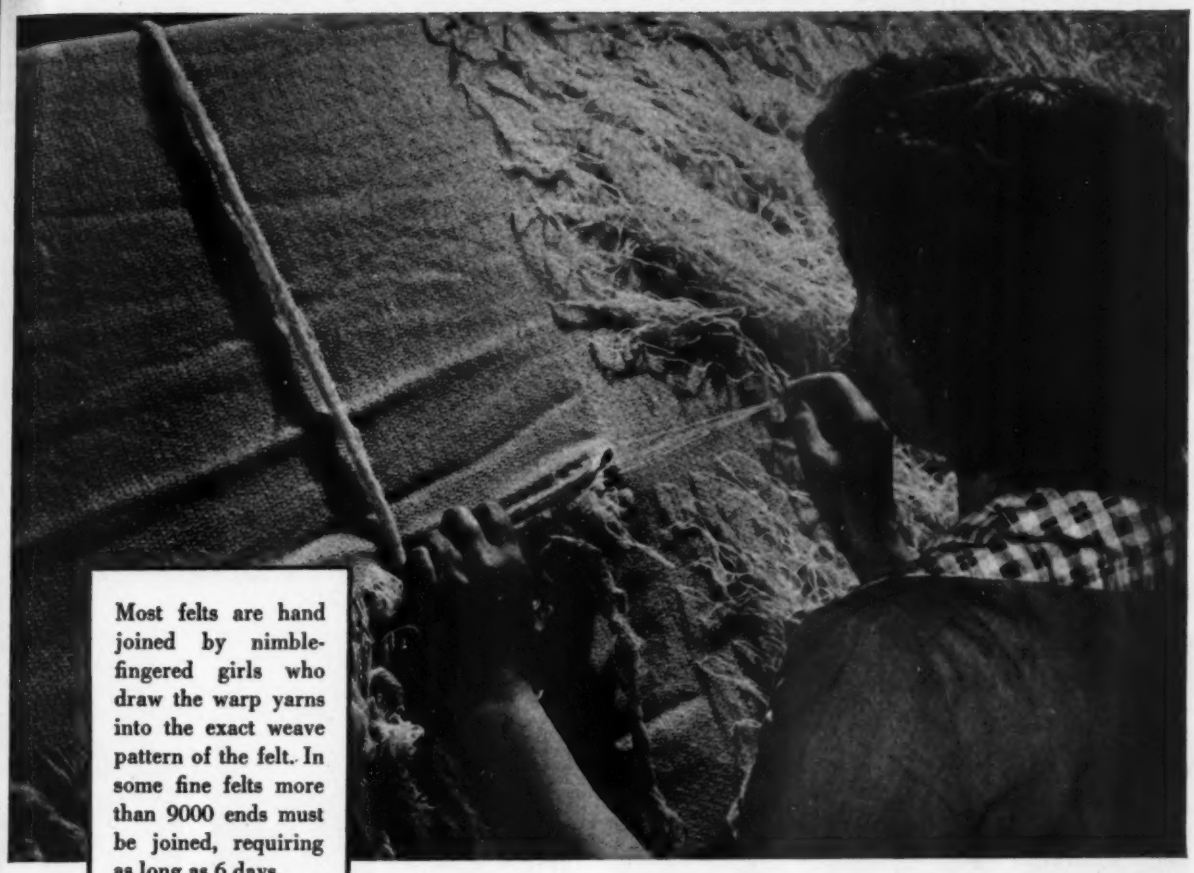
Polyethylene pipe, Mr. Bender continued, is most economical for low pressure, low temperature water. It also has been reported, he added, that polyethylene has been used successfully in piping stock from the stock chest to the head box of the fourdrinier.

Letterpress printing

At the March meeting of the Michigan Superintendents, Paul J. Thoma of the Springdale (Mass.) laboratories of Time Inc. discussed research work aimed at reducing mechanical operation variables of printing equipment.

Mr. Thoma, who was formerly at the Time laboratory in Kalamazoo, declared that the publishing firm has spent $12,500,000 over the past eight years on a research development program directed at improving letterpress printing operations.

He revealed at the meeting—a joint gathering with the Kalamazoo Valley Section of TAPPI—that vacuum rolls, ahead of the printer units, are being used experimentally to carry the paper along. Mr. Thoma also outlined the possibilities for use of lighter weight papers.

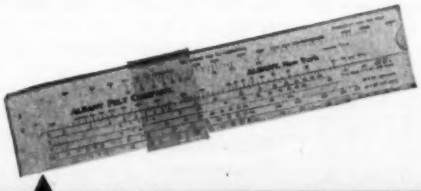


Most felts are hand joined by nimble-fingered girls who draw the warp yarns into the exact weave pattern of the felt. In some fine felts more than 9000 ends must be joined, requiring as long as 6 days.

paper is our business, too!

After weaving and inspection, felts too long or too fine to be woven endless are hand joined. So perfectly is the joining done that when a fine felt is finished only an expert can detect the joined area. Strong, smooth and uniform joins are essential for the best performance on paper machines. Operations requiring this high degree of art and skill are rare in an ordinary woolen mill, but necessary for the manufacture of high-quality felts.

In every operation: sorting the raw wool, scouring, blending, carding, yarn spinning, weaving and finishing . . . our facilities and processes are the most modern in the textile industry. **Yet *paper making* is *really* our business, for every Albany felt is designed and manufactured to meet the special requirements of an individual machine for finish, drainage, and trouble-free performance. The result: MORE TONS PER DAY.**



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The Paper Industry Names in the News

Champion Elects Rigby

Henry W. Rigby has been elected a vice president of the Champion Paper & Fibre Co. His responsibilities will be in the field of operations.

With the firm at the general office in Hamilton, Ohio, for the past seven years, he has served as director of the legal department, assistant to the executive vice president and assistant to the vice president. In his new position he will supervise management of production, woods program, purchasing and traffic.

Henry Rigby

G. R. White

George R. White is the newly appointed field manager for American Forest Products Industries for Illinois, Nebraska and Iowa. His headquarters is in Chicago. He was formerly associated with Joslyn Mfg. & Supply Co.

Four Named by Nekoosa-Edwards

Frank H. Coldwell, mill power manager since 1951, has been named manager of the newly created power department of Nekoosa-Edwards Paper Co. of Port Edwards, Wis. The department was created as a result of the merging of the outside power division and the mill power division.

In addition to former duties, Mr. Coldwell will also be responsible for maintaining and operating Nepco Lake, hydro-electric plants, the Nepco telephone system, and various affiliated operations. Associated with the firm since 1925, he is a graduate of the Massachusetts Institute of Technology.

E. P. Gleason, manager of outside power for Nekoosa-Edwards since 1912, retired March 1. Mr. Gleason was instrumental in the construction of the Centralia hydro plant and in 1917 was placed in charge of the engineering department with the title of chief engineer.

In 1913 he was made vice president of the newly organized Nekoosa-Edwards Light & Power Co. The subsidiary was sold to Wisconsin Power & Light in 1952.

F. H. Coldwell

E. P. Surprison

Ernest Berryman

R. J. Crete

Industrial relations changes

Nepco has also recently announced three appointments in the department of industrial relations.

E. P. Surprison, a member of the organization since 1932, was named employment director. In this position he will continue to supervise the selection and placement of employees and administer personnel records.

Ernest Berryman was appointed safety director and insurance administrator. In this capacity he will be responsible for the firm's safety programs, health services, workmen's compensation, N. E. M. B. A., and life insurance.

The title of training director was assigned to Russell J. Crete. He will administer programs of management development and employee training.

Walter H. Swanson of Neenah, Wis., vice president of Kimberly-Clark Corp., has been elected to succeed the late Henry G. Boon as a director of Coosa River Newsprint Co., Coosa Pines, Ala.

Konrad Tuchscherer of Menasha, Wis., has been appointd staff safety supervisor for Kimberly-Clark Corp. He succeeds the late E. A. Page. Mr. Tuchscherer has been head operating personnel man at the Neenah mill. A graduate of Lawrence College and the University of Wisconsin, he joined Kimberly-Clark in 1941.

A. E. Bachmann

H. T. Holbrook

Standard Packaging Names Two

Albert E. Bachmann and H. T. Holbrook were recently elected vice presidents of Standard Packaging Corp.

Mr. Bachmann is executive vice president of Missisquoi Corp., an affilate of Standard Packaging. He is a past president of TAPPI, vice president of the Superintendents Association and a member of the Technical Section of CPPA.

Mr. Holbrook joined Standard Packaging as sales manager of the Flex-Vac Division in 1947 and was appointed general manager of the division in 1952. An authority on packaging, he was assistant chief of the Packaging Branch of U. S. Army Ordnance from 1942 to 1945.

Marathon Names New Treasurer

At a recent meeting of the board of directors of Marathon Corp. the reelection of all directors and 12 corporation officers was announced. D. C. Everest of Wausau, Wis., continues as chairman of the board and John Stevens Jr. of Menasha as president, general manager and director.

Frank J. Dvorak of Neenah, a

your Back Line May Not Look Like This

But It Can Look Like THIS!

THE UPPER PICTURE was NOT taken in 1900, but recently, in connection with a mill modernization program. As a current specimen of a paper machine back line, it is a "horrible example" . . . probably extreme.

BUT . . . look at YOUR back line and contrast it with the picture at the right . . . a complete Sandy Hill Selective Drive installation on a new machine for which the room and drive were especially designed and built. Here is an excellent example of Sandy Hill planning and Sandy Hill efficiency.

In addition to other advantages, this drive is so designed that belts are moving at full speed in relation to machine operation when the clutch is engaged.

While this is a modern installation, it may be noted that many Sandy Hill Selective Drives are performing adequately after fifteen years of service . . . some still with their original belts.

THE SANDY HILL CREED

1. To keep informed on the problems of paper and pulp making, and
2. To engineer, develop and produce constantly better equipment to meet those problems.

THE Sandy Hill
IRON & BRASS WORKS
HUDSON FALLS, N.Y.

vice president and director, was named treasurer in a division of the former dual post of secretary and treasurer. New assistant treasurers are James P. Buchanan of Green Bay and Richard L. Johnson of Neenah. Mr. Buchanan was treasurer of Northern Paper Mills until that concern was merged into Marathon; Mr. Johnson has been manager of Marathon's tax department since June 1949.

Three Promoted by Rayonier

Donald E. Lawson, formerly resident engineer at the Rayonier Inc. plant at Port Angeles, Wash., has been named assistant resident manager of the Fernandina Beach, Fla., operation. He replaces George E. Scofield, who has been appointed assistant resident manager at Jesup, Ga.

Replacing Mr. Lawson at Port Angeles is Fred W. Stoltz, assistant resident engineer there since 1952.

Mr. Lawson has been with Rayonier since 1937, serving first as a laboratory chemist and successively becoming a process engineer, shift superintendent, assistant resident engineer and resident engineer.

In another Rayonier appointment, Dan McGillicuddy Jr., formerly with the Industrial Relations Division at Hoquiam, Wash., has been transferred to the New York, N. Y., executive offices. He will assume duties in the handling of sales promotion, public relations and the advertising program.

D. E. Lawson

L. R. Hollinger

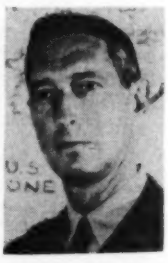
Stone Names Three

Three promotions at the Mobile, Ala., paperboard mill division of Stone Container Corp. have been announced by J. R. Boykin, general mill manager.

L. R. Hollinger, former plant engineer, has been named general superintendent; Alex Allen has been advanced from assistant superintendent to mill superintendent, and E. R. Rose, promoted from master mechanic, has been put in charge of the maintenance and repair department. Mr. Hollinger joined the mill staff in 1946 as assistant construction engineer during the installation of a 96-in. cylinder machine.

Rhinelander Paper Co. of Rhinelander, Wis., has announced the appointment of **Dr. R. C. Crain** as director of research and development. A graduate of the Institute of Paper Chemistry and formerly with Nekoosa-Edwards Paper Co. and Columbia River Paper Mills, he will head the newly organized research and development division of the Technical Department.

Dr. R. C. Crain



Gen. Mark W. Clark

Gen. Mark W. Clark, former U. S. and United Nations supreme commander in the Far East, has been elected a director of Lassiter Corp., Charlotte, N. C., packaging firm with divisions in New York City, Philadelphia, Atlanta, Miami and Greensboro, N. C.

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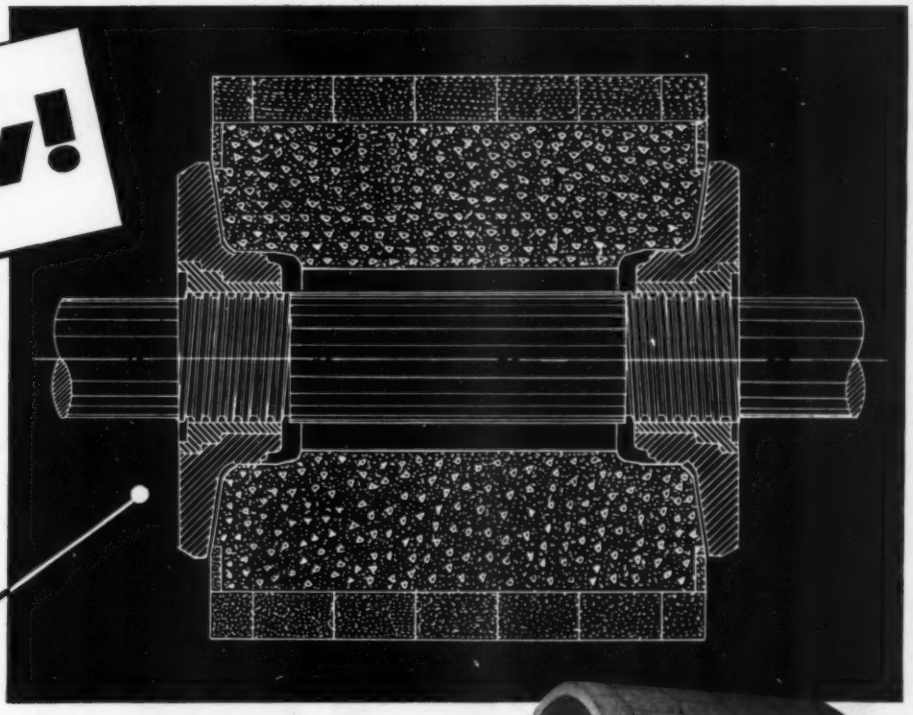

The Self-Centering, Inverted-Bevel Flange

To enable the paper industry to better meet today's demands for higher production from present equipment as well as for units incorporating larger grinders and larger stones, this improved flange has been jointly developed by the Montague Machine Company, Turners Falls, Massachusetts, the Koehring-Waterous Company, Ltd., Brantford, Ontario, Norton Company and Norton Company of Canada, Ltd.

FEATURES...

1. **The Inverted Bevel Flange is so shaped that the load is borne closer to the center of the stone — reducing shaft deflection.**
2. **Flange pressure is applied in such manner as to give better support to high load grinding.**
3. **Greater clearance between flange and grinder case permits unobstructed passage of stock to the pit.**
4. **Stones are accurately and automatically self-centered on shaft as flanges are tightened.**
5. **Space-saving design permits flange diameter of 51" or even larger.**

For further information about the new Self-Centering, Inverted-Bevel Flange, contact any of the companies listed above.

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Norton Company of Canada, Ltd., Hamilton, Ontario

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Making better products...to make other products better

Abrasives - Grinding Wheels - Grinding and Lapping Machines - Refractories - Porous Mediums - Non-slip Floors - Norbide Products

PUT ACTION IN YOUR SAFETY PROGRAM

Add a touch of showmanship to your safety program. Films let you tell your training story with the dramatic impact of pictures . . . action . . . sound. You can cut your safety training in half, give fewer refresher courses and get better results by using training films.

Here are three film sets that will help you arouse and keep alive interest in your safety program. And there is no better way to teach foremen how to be better supervisors.

SPEAKING OF SAFETY
A brand new set of films that will teach your foremen and supervisors the tips they should know about making safety talks, and how to transmit management's ideas and plans. Six 35mm sound slidefilms and leader's manual in an attractive leatherette case.

HUMAN FACTORS IN SAFETY
This is a series of six 35mm sound slidefilms with leader's manual that may be used for an advanced safety course. Each film deals with one aspect of the complex art of handling people. Collectively, the films show how to train workers, how to keep experienced people on their toes and how to win respect, cooperation and loyal support.

SAFETY MANAGEMENT FOR FOREMEN
A set of ten 35mm sound slidefilms—all that is needed for a course in safety fundamentals. The films explain how to organize a safety program, what part the foreman plays in the program and how safety increases production. They also discuss specific safety activities, such as machine guarding, safety inspections, the first aid program, etc. Complete with leader's manual in an attractive leatherette case.

Write for complete information and details to the

NATIONAL SAFETY COUNCIL
425 North Michigan Ave., Chicago 11, Illinois

The Paper Industry Necrology

E. W. Skinner

Eugene W. Skinner, 70, president of Sealright Co., died in Los Angeles March 1.

Prominent in the development of packaging for dairy products, Mr. Skinner was co-founder of Sealright in 1917 with the late Dr. Wilbur L. Wright. Mr. Skinner had been president of the firm since Dr. Wright's death in 1933. Prior to that time he was vice president and general manager. Mr. Skinner was also vice president and director of Oswego Falls Corp. of Fulton, N. Y., parent company of the Sealright Companies, and president of Sealright Pacific Ltd.

E. W. Skinner

C. R. Whitehead

C. R. Whitehead

Charles Ross Whitehead, founder in 1911 of Wayagamack Pulp & Paper Co. and prominent in the industrial development of Canada, died February 15. He was 87.

A native of Ontario, Mr. Whitehead's efforts were in no small measure responsible for the development over the last four decades of the city of Three Rivers, Que., and of the St. Maurice Valley. In 1925 he expanded his Wayagamack undertaking with the construction of a newsprint mill. Later the firm was absorbed by Consolidated Paper Corp., of which he was a vice president until recently. Mr. Whitehead was an acknowledged leader in the Canadian pulp and paper industry and for 10 years was vice chairman of the Canadian Pulp & Paper Association.

B. G. Dahlberg

Bror Gustav Dahlberg, organizer of Celotex Corp. of Chicago, died February 20 in Miami Beach, Fla. He was 73.

A native of Sweden, Mr. Dahlberg came to this country at the age of 8. After serving as chief clerk for the Great Northern Railway, he joined Minnesota & Ontario Paper Co. as vice president. He left Mando in 1921 to organize Celotex and was its president for many years, later being named chairman of the board.

E. A. Walther

Edwin A. Walther, 66, retired vice president of Hinde & Dauch Paper Co., died February 28 at Fort Lauderdale, Fla. At the time of his retirement in 1949, he was in charge of production and costs.

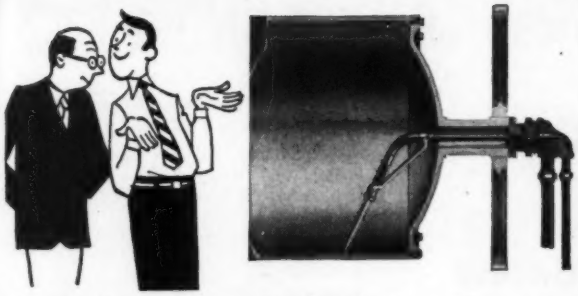
Mr. Walther joined Hinde & Dauch in 1906 as a member of the order department and during his service saw the corrugated shipping box industry grow into one of the largest industries in the country. He himself was responsible for many of its new developments and processes. In 1910 and 1911 he was superintendent of the Gloucester, N. J. plant.

A. B. Wiberg

Agart B. Wiberg, former superintendent of Gilbert Paper Co. of Menasha, Wis., died February 14. He was born in Sweden in 1886 and received his training in that country, coming to the United States in 1909. He first was associated as a chemist with various West Coast mills.

Mr. Wiberg joined Gilbert Paper in 1920 as its first technical director. He became superintendent in 1926 and served in that capacity until December 31, 1952, when he became consulting superintendent. He was a member of both the Superintendents Association and TAPPI.

E. T. Wilson Jr., 48, sales representative for the Tubular Products Div. of the Babcock & Wilcox Co., died in Portland, Ore., February 24. Prior to joining B&W he was purchasing agent for Cascade Mfg. Co., an affiliate of Electric Steel Foundry and the Hyster Co. He represented B&W in Oregon, Washington, British Columbia, Alberta, and Saskatchewan.



Superintendent X had the Answer

"We wouldn't keep buying them if they didn't work." That is what superintendent X, who knew, recently told superintendent Y still on the fence.

They were talking about Midwest Auto-flex syphons, thousands of which are today in service because they hold their position and wear indefinitely.

The spring and brace holds the end of the pipe at the proper distance from the bottom of the dryer. It cannot possibly take any other position—hence, proper water and air removal.

The cantilever leverage exerted is lower than with bent pipe syphons, only 170# vs. 354#. It clears instead of dragging on the journal and rapidly wearing out.

Order a few and you'll order more.
Performance as stated guaranteed.

MIDWEST · FULTON MACHINE COMPANY
DAYTON, OHIO

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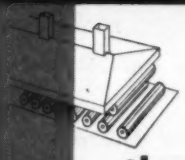

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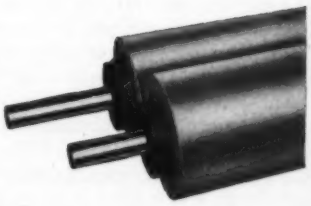

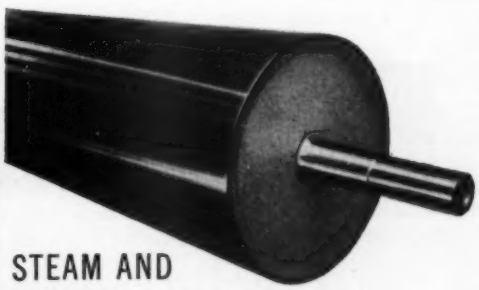

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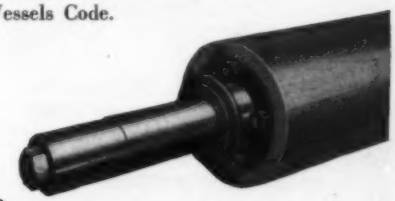
Steel or chromium plated: usual sizes 6½" to 20" diameter. Built to the specifications of the ASME Unfired Pressure Vessels Code.



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Solid maple, rubber and stainless steel.

TABLE ROLLS

Rubber, brass and stainless steel.

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The Paper Industry Safety News

1953 NSC Pulp and Paper Contest Shows 9 Per Cent Rate Reduction

COMPETING MILLS in the 1953 National Safety Council contest for pulp and paper firms have reported an accident frequency rate 9 per cent below that of 1952. Forty-one contestants maintained perfect scores, as compared to 43 in 1952.

The year's frequency rate for all divisions was 8.44; for the pulp and paper division 7.80, and for paper converting 10.18. Contestants numbered 443.

The total exposure reported was 483,555,000 man-hours, virtually unchanged from the year before. A total of 4079 injuries was reported, down 9 per cent from 1952.

Mills in Division I averaging more than 170,001 man-hours monthly recorded a 23 per cent decrease; those averaging 85,001 to 170,000 a 6 per cent decrease; those averaging 42,501 to 85,000 a 10 per cent increase; those averaging 21,226 to 42,500 a 32 per cent decrease. (Group E — plants averaging from 6,000 to 21,225 man-hours monthly — had not been organized at the time of the 1952 contest.)

In paper converting, the Paper Bag group showed an increase of 11 per cent; Boxes and Cartons a decrease of 8 per cent; Roofing Paper a decrease of 26 per cent; Insulation and Building Board an increase of 6 per cent, and Pulp and Paper Specialties an increase of 24 per cent.

From eligible mills in Division I the board of judges will choose the mill with the most outstanding record. That mill will be awarded the grand prize, the Edward Benton Fritz Memorial Trophy, presented each year by THE PAPER INDUSTRY at the National Safety Congress.

The NSC has listed the mills with the best records in each division and group as follows — frequency rates in parentheses:

Division I—Pulp and Paper Mills

Group A

1—Ecusta Paper Corp., Pisgah Forest, N. C. (0.43)

2—Quebec North Shore Paper Co. Ltd., Baie Comeau, Que. (0.45)

3—Gulf States Paper Corp., Tuscaloosa, Ala. (0.56)

Group B

1—Crossett Paper Mills, Crossett, Ark. (0.62)

2—Publishers' Paper Co., Oregon City, Ore. (0.67)

3—Consolidated Paper Corp., Ltd. Laurentide Div. (1.06)

Group C

1—Schmidt & Ault Paper Co., York, Pa. (1.13)

2—Manitoba Paper Co. Ltd., Pine Falls, Man. (1.23)

3—Price Bros. & Co. Ltd., Jonquiere, Que. (1.86)

Group D

1—Fraser Companies Ltd., Newcastle, N. B. (0.00)

1—Johns-Manville Corp., Pittsburg, Cal. (0.00)

1—The Mead Corp., Harriman, Tenn. (0.00)

1—The Bartgis Bros. Co., Ilchester, Md. (0.00)

1—National Container Corp., Ontonagon, Mich. (0.00)

1—Container Corp. of America, Circleville, Ohio (0.00)

1—U. S. Gypsum Co., Oakmont, Pa. (0.00)

1—New York & Pennsylvania Co. Inc., Willsboro, N. Y. (0.00)

1—Marathon Corp., Ashland, Wis. (0.00)

1—Strathmore Paper Co., Mill No. 1, Woronoco, Mass. (0.00)

1—Manistique Pulp & Paper Co., Manistique. Mich. (0.00)

1—The Mead Corp., Bristol, Va. (0.00)

1—Johns-Manville Co. Ltd., Asbestos, Que. (0.00)

Group E

1—National Gypsum Co., Kalamazoo, Mich. (0.00)

1—Spaulding Fibre Co. Inc., Milton, N. H. (0.00)

1—Lloyd A. Fry Roofing Co., Jacksonville, Fla. (0.00)

1—Lloyd A. Fry Roofing Co., Brookville, Ind. (0.00)

1—Container Corp. of America, Chattanooga, Tenn. (0.00)

1—The Flintkote Co., Mt. Carmel, Ill. (0.00)

1—Container Corp. of America, Wilmington, Del. (0.00)

1—Riegel Paper Corp., Riegelsville, N. J. (0.00)

1—Johns-Manville Corp., Tilton, N. H. (0.00)

1—Volney Felt Mills Inc., Fulton, N. Y. (0.00)

1—The Logan-Long Co., Amalgamated Roofing Mills Div., Chicago (0.00)

1—Spaulding Fibre Co. Inc., Hayes Plant (0.00)

Division II—Paper Converting

Paper Bags

1—Thilmany Pulp & Paper Co., Kaukauna, Wis. (0.00)

1—St. Regis Paper Co. Ltd., Vancouver, B. C. (0.00)

3—Union Bag & Paper Corp., Savannah, Ga. (1.95)

Boxes and Cartons

Group A

1—Container Corp. of America, Folding Div., Manyunk, Philadelphia (0.00)

2—Container Corp. of America, Medford, Mass. (1.00)

3—Container Corp. of America, F & C Div., Manyunk, Philadelphia (1.66)

Group B

1—Container Corp. of America, Baltimore, Md. (0.00)

1—Gaylord Container Corp., Tampa, Fla. (0.00)

1—Hankins Container Co., Chicago (0.00)

1—Bay West Paper Co., Green Bay, Wis. (0.00)

Roofing Paper

1—Johns-Manville Corp., Los Angeles, Cal. (0.00)

1—Lloyd A. Fry Roofing Co., York, Pa. (0.00)

1—Lloyd A. Fry Roofing Co., South Kearny, N. J. (0.00)

1—Lloyd A Fry Roofing Co., Robertson, Mo. (0.00)

Insulation and Building Board

1—Armstrong Cork Co., Macon, Ga. (0.00)

2—The Flintkote Co., Meridan Plant (2.17)

3—Wood Conversion Co., Cloquet, Minn. (2.61)

Specialties

1—Lily-Tulip Cup Corp., Brooklyn, N. Y. (0.00)

1—Lily-Tulip Cup Corp., Galva, Ill. (0.00)

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K-C Inaugurates Award

An honor roll plaque for departments establishing records of a 1,000,000 or more safe man-hours has been started by Kimberly-Clark Corp. The new award was announced at a safety dinner February 23. Departments with accident-free records at the time of the dinner included: Badger-Globe finishing (1,057,000 man-hours); Badger-Globe materials (1,025,161), and Lakeview Kleenex-Sanek (1,349,744).

K-C has also announced that its Niagara, Wis. mill has passed 1,000 days without a lost-time accident. The plant has worked 1,300,000 man-hours since the last lost-time mishap occurred on May 15, 1951.

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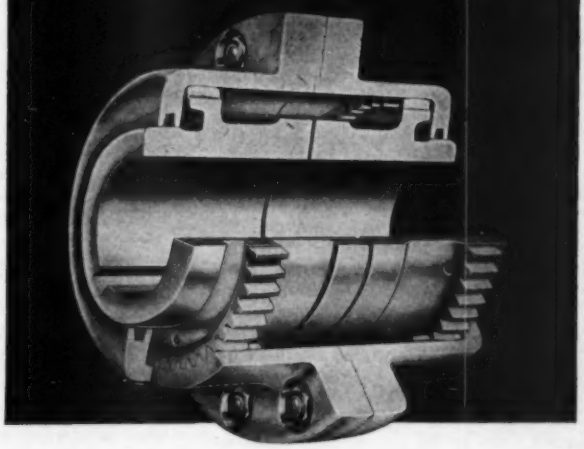

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The Paper Industry Patent Reviews

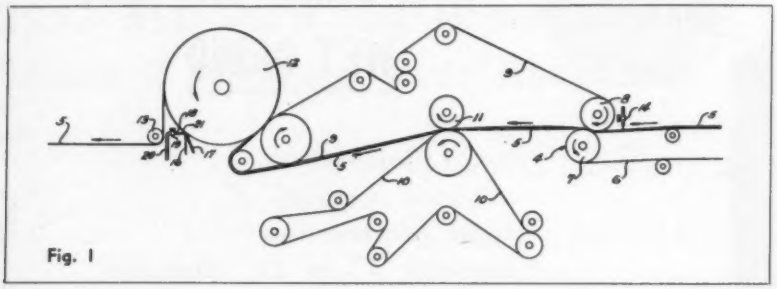

Fig. 1

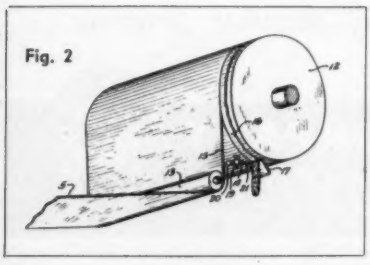

Fig. 2

MELVIN NORD*

Method of Removing Dry Paper Trim

U.S. 2,658,427, issued Nov. 10, 1953, to Henry Ver Doot Jr., and assigned to Fort Howard Paper Co., relates to improvements in trim controllers.

In the manufacture of paper it is common practice to trim the edge of the web of paper just before the web leaves the forming wire. The trimmed off portion, which is in the form of a narrow continuous strip, then travels with the main portion of the web through the felts and around the yankee drier roll. The main portion of the web leaves the drier roll for further processing, but the strip of trim adheres to the rotating drier roll and follows it around to a point where a doctor blade scrapes it from the drier roll.

Difficulty has heretofore been encountered with the trim from certain lightweight paper webs, such as tissue. As the narrow strip of trim is scraped from the drier roll by the doctor blade, it is acted upon by the air currents, which are created by the adjacent rotating rollers and other equipment, and frequently becomes entangled with the finished and trimmed web. This may result in a break of the web, which is undesirable. In addition, static electricity may cause the strip of trim to be drawn to adjacent objects which have an opposite charge, thus rendering the movement of the strip of trim unpredictable and troublesome.

In this invention, a fine stream of water is directed onto the trimmed-off paper strip, thereby weighting it so that as it leaves the drier roll it is unaffected by air currents and also thereby neutralizing any static electrical charge which it may have.

The invention is shown in Figs. 1 and 2. A web of paper (5), formed on a fourdrinier machine (4) having an endless wire (6), travels in the direction shown. Mounted above the forming wire (6) of the fourdrinier machine is a nozzle (14) which directs a stream of water under pressure on an edge of the web, separating from the web a continuous strip of trim (16).

The sheet of paper and the strip of trim adhere to the upper felt (9). The paper web and strip of trim are squeezed between the upper felt (9) and lower felt (10) in a pair of rollers (11). The paper web and strip of trim continue to adhere to the upper felt until they come in contact with the yankee drier roll (12), the web eventually leaving the opposite side of the drum and passing under a roll (12) from which it moves on to the winding or the crepeing operations. The narrow strip of trim adheres to the drier roll and is removed by a doctor blade (17).

A squirt nozzle (18) directs a fine stream of water (21) at the strip of trim as it leaves the drier roll, thus eliminating the difficulties described above.

*Patent Attorney, 664 Putnam, Detroit, Mich.

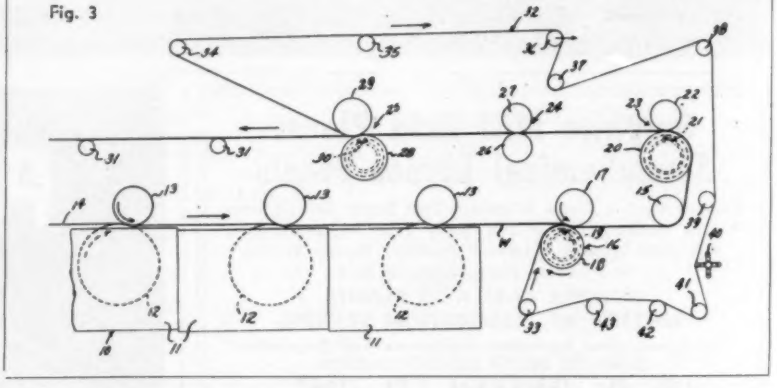

Fig. 3

Primary Suction Drum Assembly

U.S. 2,656,768, issued Oct. 27, 1953, to Roy H. Breyfogle, and assigned to Alton Box Board Co., relates to an assembly for strengthening newly formed wet delicate paper webs so that they can be handled without damage.

Shown in Fig. 3 is a cylinder type papermaking machine (10) having several cylinder vats (11), each containing a cylinder mold (12). A couch roll (13) co-acts with each cylinder mold (12). A pick-up felt (14) has a lower horizontal run over the tops of the cylinder molds (12) and through the nips between the cylinder molds and their couch rolls. The pick-up felt thus receives, on its under face, a web from each cylinder mold, and the composite web (W) is carried on the under face of the belt.

The bottom horizontal run of the felt extends horizontally beyond the last cylinder vat to a turning roll (15). A suction press (16) is provided, with a plain roll (17) and a suction roll (18) having a suction area (19). The pick-up felt (14) passes around turning roll (15) and to a suction press (23), consisting of a suction drum (20) with suction area (21) and a plain roll (22). The felt then passes through a plain press roll assembly (24) and a third suction press (25). The pick-up felt is then guided over the top of the machine by guide rolls (31).

An endless covering felt (32) covers the web as it passes through all three suction presses (16), (23), and (25). The felt (32) is returned by means of various rolls. A beater (40) acts on the covering felt (32) on its return path.

The first or primary suction drum assembly press (16) sufficiently dewaters the fragile freshly formed composite web so that it can be turned around the turning roll (15) without damage. Only half of the direction change occurs before the web is subjected to its second dewatering treatment by the press (23).

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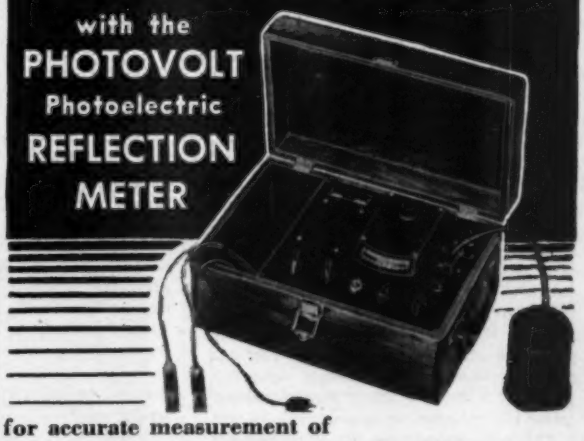

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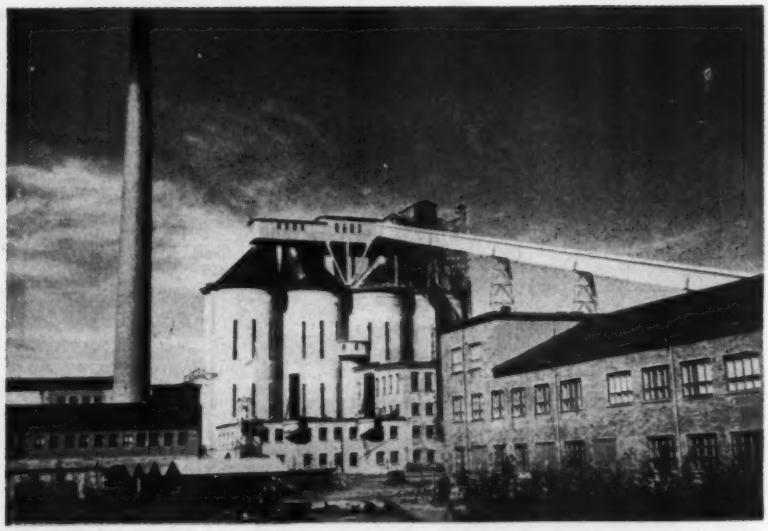
The Paper Industry Foreign Abstracts



The sulfite pulp mill in Jakobstad

The chief engineer of *Jakobstads Cellulosa*, AB, in Finland, gives a brief but well illustrated description of the mill (which began operations in 1935), with the effective modernizations that have been made in bringing the plant up to its present capacity (*i.e.*, 70,000 tons *per annum*). The article outlines changes made in barking, in the acid plant, cooking operations, screening, drying, knot-removal, power plant, and storage. It is estimated that installations will be complete about March 1, 1954. Harry Alfthan. *Paper and Timber* (Finland), 35, 495-500 (1953) (original in Swedish, with a brief English summary).

Changes in spruce resin during storage

The experiments are carried out at the Institute of Technology in Zurich. Ether extractions of finely divided wood yield variable results, and in some cases, the reproducibility is unusually poor. It appears that such extractions are never complete and that, as the time of extraction is extended, very small amounts of resin can still be removed. The amount that is extractable from freshly cut sprucewood depends on fineness of division. For example, a coarsely ground sample yields 0.7 per cent, whereas a finely divided sample gives 1.2 per cent extractives.

The resin from fresh wood should not be compared with that from seasoned wood. During storage the wood structure appears to undergo an irreversible change comparable to an increase in the "degree of fineness." In practice, freshly cut sprucewood actually yields *less* resin than does the same wood after storage.

The resin which is normally inaccessible to solvents (and which is obtained from finely divided seasoned wood) has a different chemical composition from that obtained in the usual Soxhlet extraction. Apparently the oxygen content of the former is higher. Resin extracted from green sprucewood, when stored, hardens; but this process does not seem to be due to absorption of oxygen. Such resins, stored *either* in *sealed containers* or deliberately *aerated* during storage, show the same oxygen content. (However, the stored aerated resin increases slightly in weight, whereas that in sealed containers shows practically no such change). E. K. Thommen. *Svensk Papperstidn.*, 56, 937-940 (1953) (original in German, with English summary).

Alkali losses in a Russian kraft mill

The "Kechra" sulfate pulp mill loses about 40.7 Kg. Na_2O (equivalent to 97.9 Kg. sodium sulfate) per ton of pulp. Only about 0.6 per cent of this is lost in the digester. The other losses are 16.4 per cent in the stock-washing operations, 12 per cent in the evaporation, 46.3 per cent in the furnace room, and 24.7 per cent during the causticizing reaction. J. N. Nepenin and T. N. Orlowa. *Bumazh. Prom.* (Paper Ind. of U.S.S.R.) 28, No. 2, 5-7 (1953); through *Holzforschung* 7, 128 (1953) (original in Russian; abstract in German).

Survey of the Norwegian pulp and paper industry

The author describes the development of the industry and the chief characteristics during its growing stages. At present the Norwegian pulp and paper mills have an aggregate production of about 500,000 tons of mechanical pulp, 500,000 tons of chemical pulp (on the air-dry basis) and about the same amount of paper and board. About 20,000 workers (and other employees) are in these industries, and their products now represent about one third of the total export value of all Norwegian goods. Mechanical pulp export dominates, and the other exports (paper and board) are more modest.

The future of the industry is discussed. The pulpwood supply is prone to remain at about its present level for a number of decades, but a further use of saw-mill waste and second grade wood may enhance the production of sulfate pulp. Some of the Norwegian paper and board mills have installed new equipment and their capacity will soon exceed 600,000 tons. Even though the wood-processing industries are dominant factors in Norwegian trade, they cannot compete internationally simply on a quantitative basis. High quality is essential and, thanks to skilled labor, good technicians and industrial scientists, the industry hopes to maintain its position in the future. O. T. Jarlby. *Norsk Skogindustri*, 7, No. 12, 435-42 (1953) (original in Norwegian, with brief English summary).

Studies on esterified cellulose fibers; non-absorptive light losses in microspectrophotometry

This is one of a series of comprehensive papers on the distribution of components in the plant cell wall. It emanates from the Swedish Forest Products Research Laboratory.

The author reviews briefly the problem of non-absorptive light losses in quantitative microspectrophotometry of biological material and possible means of overcoming these difficulties. He then describes, in detail, experiments on cellulose fibers esterified with p-phenylazobenzoyl chloride, in which it becomes evident that the swelling of the ester in pyridine reduces non-absorptive light losses to about 5 per cent.

In the first (qualitative) experiment, the esterified cellulose (which becomes hydrophobic in contrast to the initial hydrophylic character of cellulose) is "imbedded" in various media. For example, in alcohol (towards which it is lyophylic) the ester shrinks and remains heterogeneous (cf. Fig. 1), whereas when it is em-

bedded subsequently in a lyophobic medium (e.g. pyridine, cf. Fig. 2), it swells and becomes more homogeneous optically. The change in light absorption curves (alcohol versus pyridine) is shown clearly in Fig. 3. In the second experiment, the magnitude of the non-absorptive light losses is estimated from the light absorption curve outside the selective absorption region of a spot in the cell wall of a cross section of the esterified fiber. In the third experiment, the distribution of light behind the esterified fiber, within and without the angular aperture determined by incident light, is studied. A full description is given of the instrument built and used in this work, together with a diagrammatic sketch (Fig. 4) and a half-tone. The final experiment measures the light absorption in cross sections of esterified fibers (as a function of the thickness of the section). The results are discussed in the light of Duntley's theory of the optical properties of diffusing materials [*J. Opticäl Soc. America*, 32, 61 (1942)]. The treatment is mathematical.

Fig. 1—Cross section of an esterified cellulose fiber embedded in alcohol

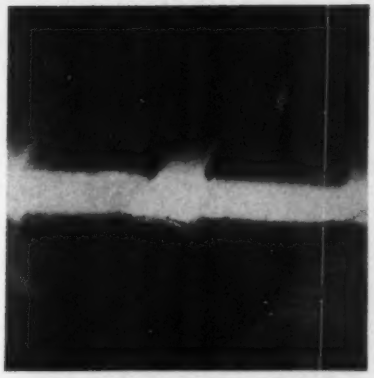


Fig. 2—Cross section of the esterified cellulose fibre from Fig. 1 embedded in pyridine

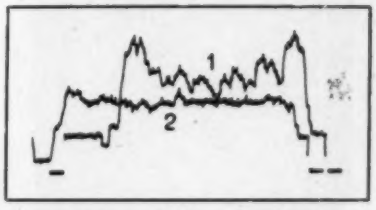


Fig. 3—Photometrically recorded light absorption curves for the cell wall of an esterified fiber first embedded in alcohol (1) and then in pyridine (2)

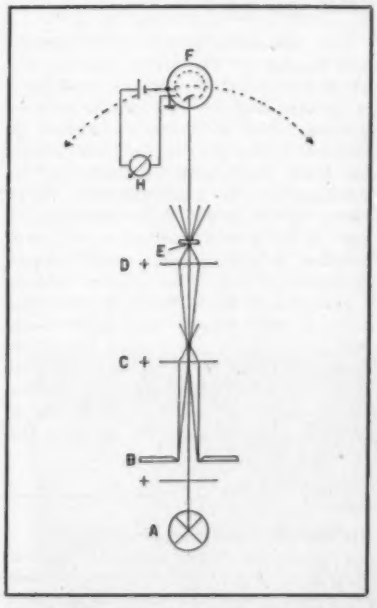


Fig. 4—Diagram of instrument for determination of light distribution in different azimuths around object. (A) light source; (B) diaphragm; (C) and (D) microscope objectives; (E) object and center of circular movement of photomultiplier tube; (F) photomultiplier tube, and (H) galvanometer

In an appendix (by Saara Asunmaa), methods are given for preparing cross sections of short fibers and for measuring their thicknesses. Sixteen figures and 11 references. Paul W. Lange. *Svensk Papperstidn.*, 56, No. 21, 807-817 (1953) (in English).

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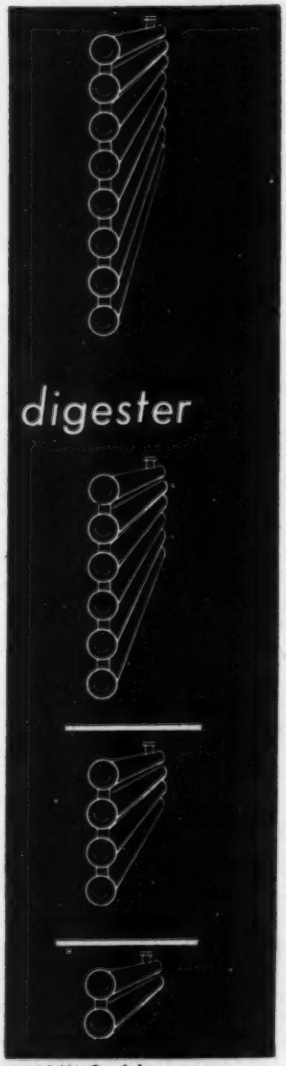

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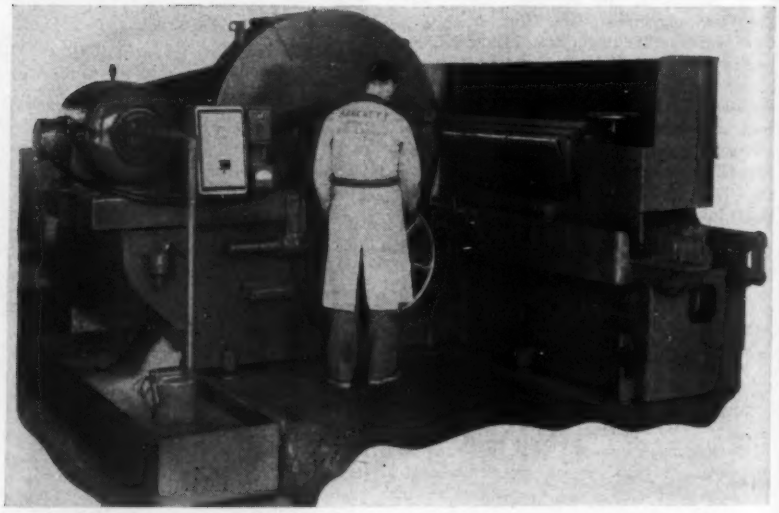


Knife grinders

Two new knife grinders have recently been developed. The first is a grinder for top and bottom slitter knives and all types of circular knives. This grinder permits grinding slitter knives to the highest of precision tolerances, both for concentricity and micro inch finish, according to the manufacturer. To insure that these slitter knives are not burned in the grinding, the new SK-24 grinder operates on the wet grinding principle, using ample coolant directly applied at point of wheel contact.

On the new Model SK-24, the grinding wheel assembly support has a rigid column type of mounting for vertical adjustment to all knife thicknesses. Cross slide movement and screw adjustments are positive and accurate, and automatic oscillation of the grinding wheel insures accuracy and fine finishes, it is claimed.

The development of an entirely new patented machine for grinding the bevels on all types of straight knives and shear blades has also been announced. This particularly applies to chipper, hog and barker knives, and all types of heavy-duty shear blades.

Incorporated in this new machine are features never before introduced into knife grinders, according to the manufacturer, making it possible to remove a tremendous amount of metal in the shortest time possible. With extremely heavy cuts possible at a high rate of table travel, using a large volume of coolant on the work pieces, knives and shear blades are ground without burning or heat generation.

It is claimed that cubic inches of metal are removed far in excess of any previous grinding methods used in the past for this type of operation. The manufacturer claims that actual test grinding on hardened steel knives has delivered them finish ground four to six times faster than ever before.

The Hanchett "Big 60" hogger, as it is called, features a 60 in. diameter segmental grinding wheel with a 5 in. precision ground grinding wheel spindle mounted in extra heavy-duty pre-loaded precision Timken bearings. The automatic infeed of the 60 in. diameter grinding wheel member is of unique design, as it incorporates hydraulic cam actuated control mechanism, with graduated dial, in increments of .0005 as standard. Finer feeds are available when required. In addition to the automatic infeed, there is a large manually operated hand wheel, which makes this infeed a dual controlled unit. *Hanchett Mfg. Co., Big Rapids, Mich.*

Spherical roller bearings

Increased anti-friction bearing capacity of from 25 to 50 per cent and service life two to three and one-half times longer than formerly possible is now obtained with SKF's improved design of spherical roller bearings, according to the manufacturer, who also claims that this performance improvement has been accomplished without any change in size or weight.

The inner race of the improved bearing is a new design without undercuts and integral flanges. Its capacity is increased because longer rollers are used, with more effective contact between rollers and rings, in the larger area provided by the new design. A separate guide ring, between the two rows of rollers, allows them to take the position which their contact with the rings dictates. Load distribution is uniform at all times.

The improved spherical roller bearing, designated as the "C" type, is available in series 222 and 223. *SKF Industries, Inc., P. O. Box 6731, Philadelphia 32, Pa.*

Hydrophilic starch derivatives

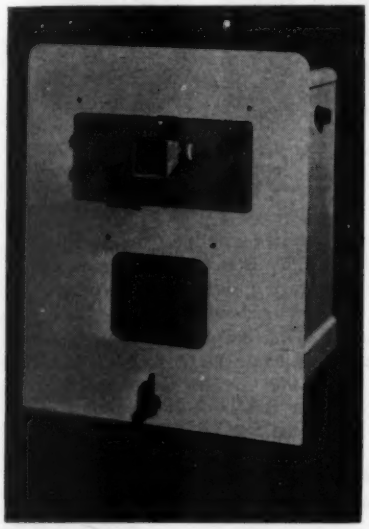
A new series of hydrophilic starch derivatives, with excellent film-forming properties which offer broad possibilities for calendar sizing is now on the market.

Carboxymethyl starches are sodium salts of carboxymethyl derivatives of starch. CM starches, as National calls them, are white to light tan in color and are available in three viscosity grades: high, medium and low.

The hydrophilic and excellent film-forming properties of CM starch are said to retard the penetration of hydrophobic or oily materials, such as ink, grease, and wax. Because of these inherent properties, the CM starches should find special calender applications for improving the gloss ink printability of patent-coated boxboard and other types of board. Calender application of CM starch also reduces fuzz and gives a better, smoother, well bonded surface for improved appearance and printing properties, according to the manufacturer.

Other potential applications for CM starches include application to wallboard or other porous boards as a barrier film to reduce penetration of a subsequent coating with paint or other materials; in tub sizing to improve such strength factors as pick, fold and mullen, and in formulations with

other starches for improved grease-resistance; as a beater additive; and in some specialty coating applications. *National Starch Products Inc., 270 Madison Ave., New York 16, N. Y.*



Micro balance

The Micro Gram-atic Balance, a 20 gm capacity micro balance, has the same features found in the 200 gm Gram-atic and 100 gm. Semi-Micro Gram-atic Balances; i.e., high speed, single-pan design, two knife edges, fast air damping, and automatically registering weights.

The accuracy of the new instrument, according to the manufacturer, is ±0.002 mg. Because all weighings are made under a constant load, the sensitivity remains constant throughout the weight range of the balance. Another feature of this instrument is high speed (5 to 8 minute carbon and hydrogen weighings are now completed in 35 seconds).

The Gram-atic body now has a metal front shield to protect the balance from the operator's body heat, and the entire balance is finished in permanent white enamel for optimum heat reflectance. *Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa.*

Enclosed roller-type hold-back

The enclosed roller-type hold-back is designed to prevent reversal of bucket elevators and inclined conveyors due to power failure under load. It consists of an inner member with wedge pockets for six hardened rollers which rotates with the shaft. When the shaft attempts to reverse, the rollers wedge against an outer cylinder. Pressure springs and plungers guarantee instant engagement of the rollers, according to the manufacturer. The hold-back releases instantly when forward motion of the shaft is resumed.

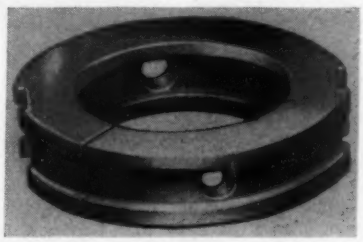
The hold-back mounts directly on the drive shaft, with the torque arm bolted to a support with sufficient strength to resist the load exerted when reversal occurs. Maximum torque resistance ranges up to 350,000 inch lbs. for units with a maximum bore of 7 inches. *Standard Products Div., Stephens-Adamson Mfg. Co., Aurora, Ill.*

Valves

A redesigned line of 600-lb. small steel globe, angle and check-list valves has been introduced. Two new features, a "full-way" plug-type disc with increased seating width and a new chromium stainless steel seat which eliminates conventional seat rings, have been incorporated into these valves.

The new disc, made of Type 420 chromium stainless steel, has a 500 Brinell hardness. The "lay-on" seat, Type 410 chromium stainless steel containing 13 per cent chromium, has a 350 Brinell hardness. This accounts for a sharp reduction in erosive action. Elimination of the use of seat rings solves ring breakage and ring joint leakage.

According to the manufacturers, the combination of these exceptionally hard metals, prevents disc and seat scoring and, at the same time, greatly increases valve efficiency and service life. *Lunkenheimer Co., Cincinnati, Ohio.*



One-piece seal cage

A new one-piece, flexible Teflon seal cage has been developed for use on stuffing boxes on pumps, mixers, reactors and other types of processing equipment.

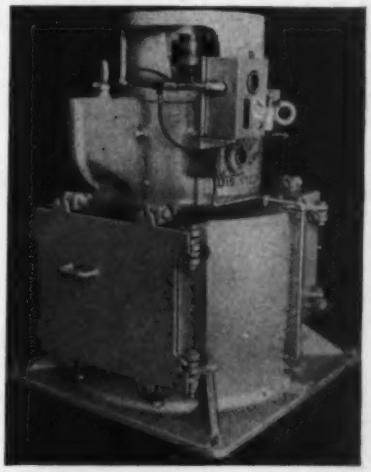
These seal cages were developed to overcome the handicaps experienced with two-piece metal lantern rings, and can be easily snapped over the shaft without dismantling pump or pulling the shaft. They will not score the shaft during operation, even at high speeds, and will last considerably longer than metal lantern rings, according to the manufacturer. Their design and construction provide a seal cage that will not bend or collapse under extreme gland pressure.

These seal cages are available in standard or special sizes to fit any pump, mixer or agitator. *Chemical & Power Products, Inc., 11 Broadway, New York 9, N. Y.*

Remote liquid level indicators

A new "wide vision" face on Yarway remote liquid level indicators allows reading from the side as well as front of the indicator. Boiler water levels and other liquid levels can be checked from almost any position. The indicating mechanism is operated by the boiler water level itself.

These indicators are of the manometric type with automatic temperature compensation, as approved for use under the recent A.S.M.E. Boiler Code Committee ruling. *Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, Pa.*



Disintegrator with swing-door body design

The new swing-door body design of disintegrators provides complete watertightness for processing wood pulp, permits faster, more economical cleaning of the interior, and changing of hammers or screens, according to the manufacturer.

The design was recently developed as an optional replacement for the standard detachable skirt housing in order to provide constant removal of processed pulp from the unit and to prevent leakage. Two swing-doors are installed on either side of the disintegrator, providing maximum accessibility. Doors merely swing back out of the way, saving time and effort required to detach conventional skirts. Use of swing-door design permits heavier construction of the entire unit. *Rietz Mfg. Co., 150 Todd Rd., Santa Rosa, Calif.*

Paper coating

The new Polyamide resin-epoxy resin paper coatings, compounded from Polyamide 100, epoxy resins and vinyl resins plus organic thinners, are claimed to be superior in many ways to acetate laminations at a fraction of the cost.

Polyamide-epoxy resin coatings feature high gloss plus superior resistance to grease, water, alkali and many chemicals. They also have outstanding abrasion resistance, according to the manufacturer.

Paper coated with Polyamide-epoxy resin

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TMI-BEACH PUNCTURE TESTER

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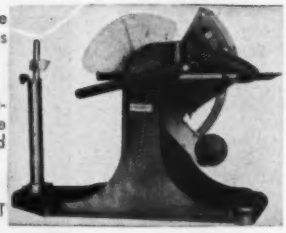

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For wet materials, these structures are reinforced concrete faced on both sides with glazed tile; for dry materials, they can be either this same construction or steel-reinforced hollow tile.

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Write for Bulletin A-153

SEMCO
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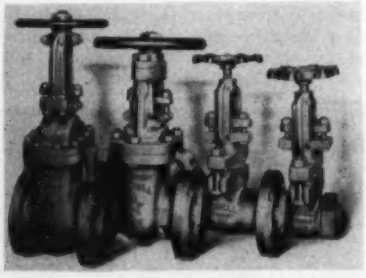
STEBBINS ENGINEERING CORP. — TEXTILE TOWER, SEATTLE, WASH.

is said to withstand sharp bending without damage. The coatings bond tightly to many surfaces, refusing to chip, flake or peel. *Chemical Market Development Dept., General Mills Research Laboratories,* 2010 *E. Hennepin, Minneapolis* 13, *Minn.*



Corrosion resistant valves

A new line of Powell valves, known as Ni-Resist valves, are specifically designed to checkmate the high cost of corrosion.

These new valves are especially adapted for handling pulp and paper mill liquors, alkalis and sludges, caustic soda, and many other fluids.

Ni-Resist is an alloy with far greater corrosion and heat resistance than ordinary cast iron. While similar to gray iron and resembling austenitic stainless steel in many characteristics, no other cast metal is said to offer such a unique combination of useful properties. *Wm. Powell Co., 2525 Spring Grove Ave., Cincinnati 22, Ohio.*

MILL COGS

We make a specialty of "Ready Dressed" cogs which are READY TO RUN the moment driven and keyed. Write for circular "O" and instruction sheets free.

The N. P. BOWSHER Co., South Bend, Ind.

Internal fin tubing

Of particular interest to design engineers associated with unusual problems of heat transfer is tubing with integral fins on the inside surface. Such tubing has recently been produced by extrusion.

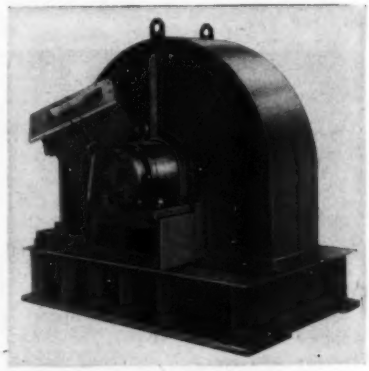
One of the most important factors in heat transfer is surface area. With fins on the inside or outside of tubing, the surface area is greatly increased, thus permitting a greater transfer of heat in a tube of a given length and diameter. Additional information pertaining to special tubular shapes produced by extrusion is available upon request. *Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.*

Steam-cleaning material

The new cleaning material, Oakite Composition No. 93, is specifically designed for use in steam-generating equipment and in steam guns where the solution is siphoned from an auxiliary tank.

This cleaning material is a white free-flowing powdered substance which is readily and completely soluble in water in a broad range of concentrations and use. It possesses exceptionally high sequestering ability and, when added to water up to 20 grains hardness, will show no precipitate or turbidity, according to the manufacturers.

Normal working concentrations range between ¼ and 4 oz. per gal. of water. Solutions of Composition No. 93 are nontoxic and do not give off any offensive odors or unpleasant fumes, it is claimed. *Oakite Products, Inc., 116 Rector St., New York 6, N. Y.*



Waste wood chipper

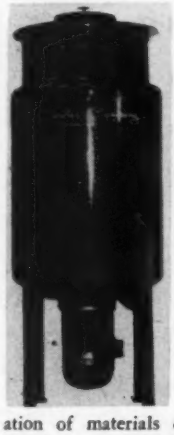
Quantity production of quality specification-size pulpwood chips can be obtained from slabs, edgings, round wood or veneer cores with the new high-speed multi-knife waste wood chipper, according to the manufacturer. It is said to operate with a mini-

mum of slivers, sawdust and chip rejects. There are few parts to replace, and the chipper is easy and inexpensive to maintain.

Made in three sizes (56, 64, and 72 in. diameter) which will process from 8 to 18 units per hour (200 cu. ft. per unit), it can be used as a portable unit, mounted on skid or trailer for Diesel engine drive. Its welded steel hood is furnished plain, as illustrated, or as a blower housing when pneumatic chip conveying is desired. *D. J. Murray Mfg. Co., Wausau, Wis.*

Back-up rings

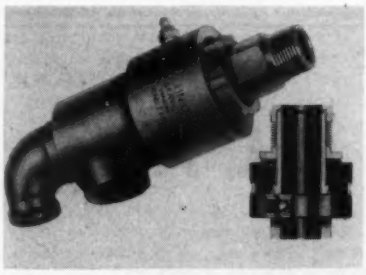
Back-up rings, spirally machined of tetrafluoroethylene (Teflon) have been designed to prevent extrusion of "O" rings. The Teflon rings have a high impact strength at temperatures from —100° F. to +500° F., and are non-corrosive, non-adhering, non-fraying, inert to most chemicals, and self lubricating, according to the manufacturer. They are made for all "O" ring sizes to AN drawings 6227 and 6230. *Garlock Packing Co., Dept. 34, Palmyra, N. Y.*



Dissolver

A new "Bottom Drive" model of the Ultrafast dissolver, said to be successful in speeding up dissolving, dispersing and mixing operations by as much as 32 times, is assembled with the motor mounted beneath the unit. The shaft driving the impeller enters from the bottom of the tank. This eliminates aeration of materials during processing and permits easy and effective pressurizing of the mixing tank. With the motor in this position, the process of charging the tank is very simple.

The new machine, Models 1OUD and 2OUD, will be built to manufacturers' specifications and is available in a wide range of tank capacities. Gear drives can also be furnished. *Cowles Co., Inc., Cayuga, N. Y.*



Mechanical seal

A new design featuring field repair of the "Rotary Union," a revolving sealing connection between a stationary supply pipe and a revolving machine cylinder, roll or drum, has been announced. Low friction

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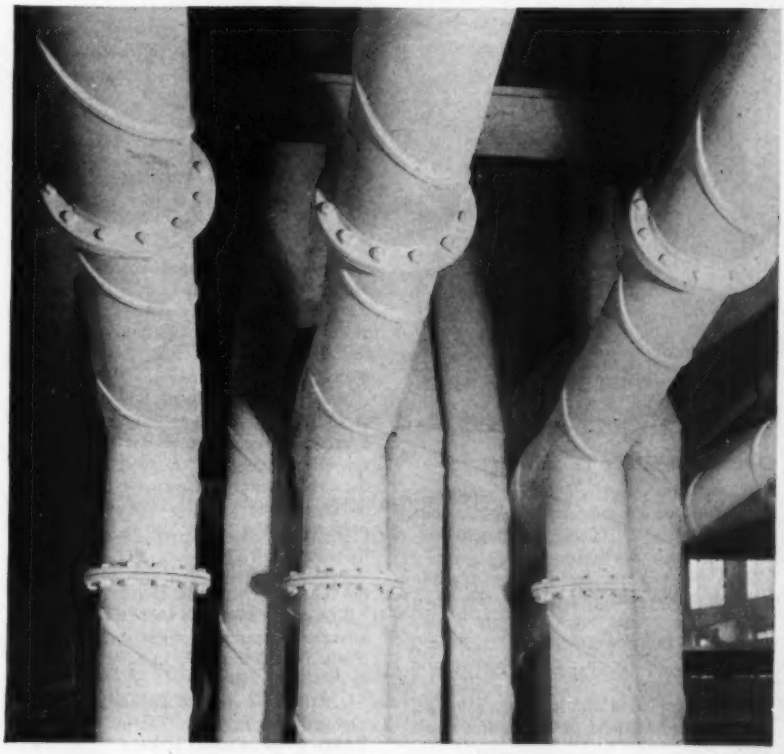

Naylor pipe and Naylor fabrication service provide a most dependable combination for paper mill piping layouts. First, the exclusive Lockseam Spiralweld structure makes Naylor pipe extra strong, yet light in weight for easy handling. And Naylor fabrication service provides special fabrications and fittings to your exact specifications, no matter how intricate. Together, they give you the answer for delivering water, pulp, or air wherever you want it.

Write for Bulletins No. 507 and No. 525 covering this dual service.

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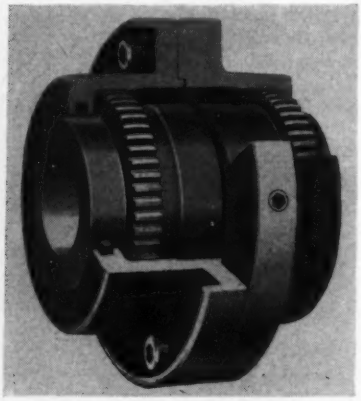
ball-bearing and mechanical seal construction reduces wear and power consumption.

According to the manufacturer, this new design will give even greater performance than their former factory sealed units.

Conversion field repair cartridges are available for the factory sealed units now in service. Repairs and conversion can be made in a few minutes with ordinary tools, it is claimed. Factory repair and converting service will be maintained to provide service to those who prefer it. The new construction applies to all standard "Rotary Unions" ¼ through 2 in. pipe sizes, for use on steam, water, air, gas or oil applications up to 250 psi. *Perfecting Service Co., 332 Atando Ave., Charlotte 6, N. C.*



Geared flexible couplings

A new line of geared flexible couplings for high speed and high torque applications is now available. These couplings combine sturdiness and light weight.

The two-section, free-floating housing has internally cut gear teeth. The two sections are rabbet fitted and are bolted together to function as a single rigid unit, forming a dustproof, lubricant-retaining enclosure.

The wide face of the internal gear teeth provides for end float of connecting shafts while maintaining full tooth contact. The externally cut gear teeth of the hubs are machined to provide constant clearance at the root of the internal teeth of the housing, thus accommodating reasonable misalignment. *Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.*

Latex for clay coated paper

An improved latex for clay coated paper has been developed. Known as Dow Latex 512-R, the new latex is actually an improved Dow Latex 512-K. Like its predecessor, this latex is a styrene-butadiene copolymer and, therefore, retains all of the general properties of the original coating material.

In addition, the new latex offers improved stability, compatibility and binding power, all important properties in off-machine, machine and size press coating operations. The improvements result from the employment of a new stabilizing system which provides increases in starch and dextrin compatibility, pigment compatibility, mechanical stability, tolerance to water-soluble polyvalent salts, and pigment binding in starch-latex binding systems. *Dow Chemical Co., Plastics Sales Dept., Midland, Mich.*

Stainless steel tubing

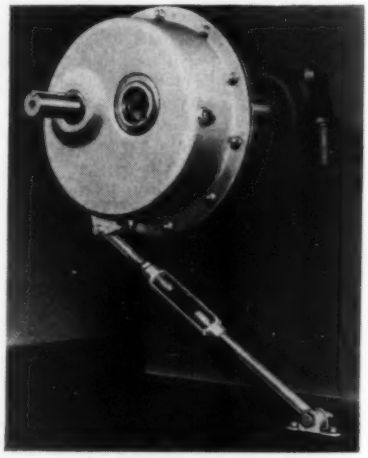
A new high strength, thin wall stainless steel tubing has been developed for industrial use where corrosion resistance, light weight and special shapes or bends may be required. In addition, the company states it will engineer special applications of the tubing in combination with fittings and its own flexible tubing or expansion joints.

Standard straight wall tube is available in 15 outside diameters ranging from 1 to 6 in. The high strength comes in 13 outside diameters, from 1.5 to 6 in. All but the smaller sizes are available in four wall thicknesses designed to withstand various pressures. The 1.5 in. size in high strength and the 1 in. and 1.25 in. sizes in the standard are made in three different wall thicknesses. On special order, the company will supply diameters, wall thicknesses and tolerances other than those shown in specifications. Ordinarily, tolerances are plus or minus .002 or .003 in. *Flexonics Corp., 1311 S. Third Ave., Maywood, Ill.*

Rotary pressure joints

Availability of the Type "L" Johnson rotary pressure joints in all sizes of the standard joint has been announced. Of further interest in the development of a new method of supporting the Type "L" joint by adjustable hangers suspending the joint from the machine frame. The hangers hold rods inserted in the lugs of the Type "L".

Type "L" joints are available for use with stationary or rotating syphon pipes. *Johnson Corp., Three Rivers, Mich.*



Shaft mounted drive

A new speed reducer which mounts directly on the shaft to be driven and requires no floor space other than that needed for the motor and tie rod connection has been announced. Easily adapted to fit various driven shaft diameters, this all-steel drive offers comparatively high ratios of speed reduction in very limited space.

A choice of single or double reduction unit makes possible the selection of almost any output speed between 420 and 14 rpm, merely by changing sheave sizes within allowable limits. Six sizes cover the range from ½ to 30 hp. *Falk Corp., Milwaukee, Wis.*

Headbox additive

A new type of starch, based on a cationic starch derivative, specifically developed for wet end addition on the paper machine, has been announced.

Cato starch, as the new headbox additive is designated, is said to be very effective in improving strength factors, such as mullen, fold, tensile, pick, etc., at low concentrations on different types of pulp.

According to the manufacturer, excellent

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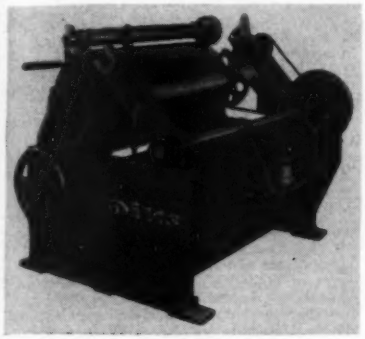
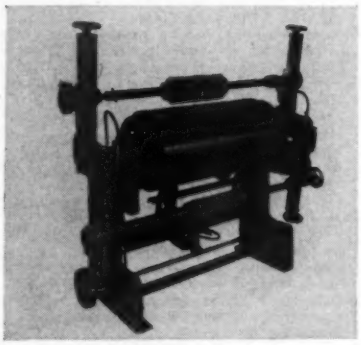
retention of fillers and pigments, such as TiO_2, can be obtained with the use of Cato starch. Also of interest to the paper industry is the fact that this starch improves sheet formation and produces good drainage on the paper machine wire, enabling the manufacturer, in many cases, to increase machine speed without loss in strength. *National Starch Products Inc., 270 Madison Ave., New York 16, N. Y.*



Winder



Unwinder

Winder and unwinder

Continuous roll changes affording continuous operation with constant control are made with the new Ferrisplice unwinder, and continuous winding of rolls is now possible with the Surfastart winder.

Principally designed for use on printing presses, bag machinery and other processes running glassine, acetate or cellophane, these new units are now available in standard models for web widths from 20 to 40 in.

Roll changes at speeds of over 400 fpm have been made with the unwinder without loss of register, it is claimed. Ferrisplice Model FSU-A handles rolls ranging from 9 in. to 24 in. O.D.; Model FSU-B, from 6 in. to 18 in. O.D. Maximum roll weight is 500 lb.

With the Surfastart continuous winder, very accurate rolls with straight edges are wound without stopping press to change cores, according to the manufacturer. In most cases, starting of the new roll is done at full operating speed. The completed roll is removed while the new roll is winding. Model SSW provides continuous winding of rolls on cores 3 in. I.D. and larger. Rolls up to 500 lb. can be wound to diameters of 6 in. to 24 in. *Dilts Machine Works, Fulton, N. Y.*

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If your felts tend to rot—develop holes in a hurry—it is probably due to bacterial attack, particularly during the long weekend shut downs. The prescription? Orr An-Bac felts—the kind that are treated chemically to combat bacteria.

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If attack is by chlorine, muriatic acid, sulphuric acid —or any other acid—either An-Bac or Orr-Chem felts will help you.

Or you may require just standard felts of the proper construction. We have them, too.

Let's us repeat . . . Orr doesn't just sell felts. They prescribe them.

Take your felt problem up with the Orr representative when he calls, or write

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AN-BAC ANTI-BACTERIAL FELTS
STANDARD UNTREATED FELTS

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The Paper Industry New Literature

Books

DRYING OF PAPER IN THE PAPER MAKING PROCESS. By A. E. Montgomery. Published by William L. Barrell Co., 52 Chauncy St., Boston, Mass. 5 x 8. 43 pages. $1.00. Paper-bound. The important subject of drying paper has never before been adequately treated in the literature of the paper industry. For this reason this monograph has been written.

The author has brought to this study the experiences and reflections of many years as a specialist in heating and ventilating. It is written in a clear and readable style.

The material presented in this treatise covers water removal at the wet end; drying as a matter of heat transfer; manner of water removal from the paper web; water removal on machine with drier felts; what is meant by drying rate; factors which influence the rate of drying; the effect of changing steam pressure; reduction in drying temperature; influence of length of draw and arc of contact; resistance to heat flow from steam to paper; heat flow from steam to drier shell; the flow of heat through the drier shell; heat transfer from drier shell to paper; air supply systems to air drying; removal of vapor from the driers, and some practical considerations.

Through the courtesy of TAPPI, all the TAPPI Data Sheets relating to the drying rates for various papers are reproduced as an appendix to this book. These will be found very helpful whenever the drying capacity of a paper machine is being studied to determine whether the machine drying rate is all that should be expected.

CONSERVATION LAW AND ADMINISTRATION. By William F. Schulz, Jr. Published by Ronald Press Co., 15 East 26th St., New York 10, N.Y. 6¼x9¼. 607 pages. $10.00.

Sponsored by the Conservation Foundation, this book is the first comprehensive examination of conservation law and the administration of a state program for renewable natural resources. Using Pennsylvania, a leader in resource management, as its yardstick, the book presents a digest of that state's conservation laws and pertinent federal statutes, as well as a commentary on their scope and adequacy. It examines in detail the organization and operation of state and federal agencies.

Three of the 16 chapters are devoted to forestry, presenting information about state and federal statutes, ownership and administration, and the Pennsylvania forest program.

From the critical analysis of the law and its implementation emerges the draft of a Model Conservation Act, included in the final chapter. This Act presents a blueprint for legislative action to improve administration and substantive law in modern conservation practice. Designed for interested public or private groups, it is a working guide toward setting up standards for better conservation planning and management, which can be applied successfully not only in Pennsylvania, but in every state in the country.

HANDBOOK OF PROBABILITY AND STATISTICS WITH TABLES. By Richard Stevens Burington and Donald Curtis May, Jr. Published by Handbook Publishers, Inc., Sandusky, Ohio. 5¼ x 7¾. 340 pages. $4.50.

This book is a summary of theory, working rules and tabular material useful in practical problems in probability and statistics. It contains information which is not otherwise readily available in simple form except by reference to numerous journals, tables, and treatises on the subject.

Divided into two main sections, the first part includes a summary of the more important formulas and definitions of elementary statistics and probability theory, and the second part consists of tables of distributions and other quantities of frequent use in statistical work.

Booklets and Pamphlets

FELT BULLETINS. Published by F. C. Huyck & Sons, Rensselaer, N. Y. 6 x 9¼. As stated in the introductory bulletin to this new series (Vol. II), this "library" of technical bulletins covers the use, operation, and maintenance of papermaker's felts. Some of the older fundamental bulletins which are still applicable despite the great changes in papermaking will be re-issued. Other bulletins will be brought up to date, and entirely new bulletins will be added to the series. Some of the material has been obtained directly from paper mills. These bulletins will be published through the combined efforts of both the Research and the Field Service Engineering departments of F. C. Huyck & Sons.

Bulletin No. 1 on the "Dewpruf" treatment, consisting of eight pages, discusses the detection and prevention of bacteria damage to paper machine felts. "The Balance of Construction in Felt Design" is the topic of seven-page Bulletin No. 2. Succeeding bulletins in this series will be reviewed as they are published.

GLOSSARY OF TERMS USED IN METHODS, TIME STUDY AND WAGE INCENTIVES. Second edition. Published by the Society for Advancement of Management, 74 Fifth Ave., New York 11, N.Y. 4 x 9. $1.00. This glossary contains 332 definitions compiled by 93 management leaders of the Society. Each of the terms and expressions is defined on the basis of their interpretation by the greatest number of experienced people using them professionally and successfully.

ACCIDENT FACTS. Published by National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. 96 pages. 75 cents. (Prices reduced for quantities). Twenty pages of this book are devoted to occupational accidents and provide the factual background necessary to give direction to an industrial safety program. There is a detailed list of accident rates by major industry groups, as well as charts showing the accident trend during the past 25 years. Most common source of injuries, part of body most frequently injured, off-the-job accident problems, unsafe acts and unsafe conditions contributing to permanent impairments and deaths, and other topics are included. Also presented is statistical information on accidents of all types—motor vehicle, transportation, home, farm and school.

DISPERSION OF TITANIUM DIOXIDE USING THE INTENSIVE MIXING PROCEDURE (Technical Bulletin No. 906). Published by American Cyanamid Co., Calco Chemical Div., Bound Brook, N.J. 8½ x 11. 13 pages. This booklet begins with a brief introduction and goes on to discuss the following topics: the intensive mixer operation, the mechanism of dough-mixer dispersion, the dispersing vehicle, selection of the pigment type, operation of the laboratory intensive mixer, and the critical dispersion point. Five graphs and six tables are included.

HOW TO ORDER PAPER PROPERLY. By Charles V. Morris. Published by Henry Lindenmeyr & Sons, Div. of Hubbs Corp., 480 Canal St., New York, N.Y. 5½ x 7½. 56 pages. Book No. 2 in the Lindenmeyr Library of Print Shop Helps, this booklet tells its story in case history format, with the aid of tables and special listings.

DEVELOPMENT OF MICHIGAN'S TIMBER INDUSTRIES THROUGH FOREST PRODUCTS RESEARCH. Published by Forest Product Research Div., Michigan College of Mining and Technology, Houghton, Mich. 6 x 9. 26 pages. This booklet is divided into three sections explaining how the research program operates, results of the program, and industry's part in it. It describes some of the accomplishments of the Forest Products Research Division since its organization in 1947. Featured are some of the important results of research projects in which Michigan timber has proved feasible for such items as corrugated paper, hardboard, etc.

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Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.*

Liquid Level Gage Valves. Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass. —A set of 9 new data sheets covers the complete line of liquid level gage valves for both tubular and flat gages, regular, offset and with union connections to gage. Complete specifications with illustrations showing cross sections, roughing dimensions, and standard and optional connections available are included.

Industrial Waste Treatment. Gilbert Associates, Inc., Dept. SS, Reading, Pa.—This 34-page brochure shows how GAI has incorporated the latest developments in waste engineering in the design of many sewage industrial waste projects for industries, municipalities, and governmental agencies. A unique feature of the brochure is the back cover pocket, which includes a smaller edition of the large book, with project and client lists.

Packaged Automatic Boilers. Orr & Sembower, Inc., Morgantown Rd., Reading, Pa.—Bulletin 1219, containing 16 pages, describes "Powermaster" packaged automatic boilers in 17 sizes, from 15 through 500 hp for steam process as well as steam and hot water heating service. The first portion of the bulletin describes the advantages of packaged automatic boilers contrasted with equipment of conventional design. Detailed specifications describe the boiler, burner, and control systems. Typical installation photographs are shown. Also included are drawings, cutaway views, and other useful boiler data.

Materials Handling Equipment. Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.—A comprehensive line of equipment for the "floor level" handling of goods and materials is presented in Junior Catalog No. 585. The 100-page eleventh edition of this pocket-size catalog contains information, illustrations and specifications on fork trucks, high lift electric trucks, pallet trucks, industrial tractors, electric and hand lift trucks, steeleg skids, semi-live skids and lifters, portable and industrial elevators, portable cranes, stacking frames steel storage racks, lifting and die tables, hand trucks, and handling specialties. New equipment developed since the tenth edition was issued is shown.

Oiling and Filtering Systems. Wm. W. Nugent & Co., Inc., 410 N. Hermitage Ave., Chicago 22, Ill.—Bulletin No. 14B, containing 8 pages, describes oiling and filtering systems for paper mill machinery. Included are pressure-type filters and gravity systems designed to provide an adequate supply of clean, cool oil to even the fastest, biggest paper mill machines.

Couplers. Snap-tite, Inc., 201 Titusville Rd., Union City, Pa.—Quick connect-disconnect couplers are described in Catalogue No. VP 83, containing 8 pages. Outstanding features of the coupler are listed. Specifications of valve-type couplers and nipples and plain-type couplers and nipples are listed in tabular form. Another table lists parts for Series VC-VN and PC-PN. Coupled and uncoupled length data for valve couplers and valve nipples, plain couplers and plain nipples are given in two more tables.

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WANTED—One Turbine Operator, by large paper company in Northern Maine. Experienced in all phases of operation of medium-sized Westinghouse bleeder type turbines in a plant of 20,000 kilowatts capacity.

Boiler Room Foreman, must be experienced in the operation of pulverized coal equipment. Medium pressure, water tube boilers. Steady work, retirement plan, other benefits.

Please state full qualifications in first letter. Address: Box 567, The Paper Industry.

FOR SALE—Chipper, 74", new condition, with 350 hp motor, starter and exciter set. Located in Eastern Canada. Address: Box 571, The Paper Industry.

FOR RENT OR SALE—SACRIFICE. 10,000-100,000 sq ft. floor space as single unit or will divide, industrial zone, 21st ward Phila., Pa. Off-street driveways, insulated rooms available, high ceilings, unlimited floor loads, immediate possession, favorable terms. L.B.A. Co., Room 1200, 11 W. 42nd St., New York 36, N.Y., LO 4-6370.

WANTED—Mechanical Engineer to take charge of all plant maintenance in growing pulp and paper mill in North Carolina. Please include summary of background and experience with reply. Address: Box 572, The Paper Industry.

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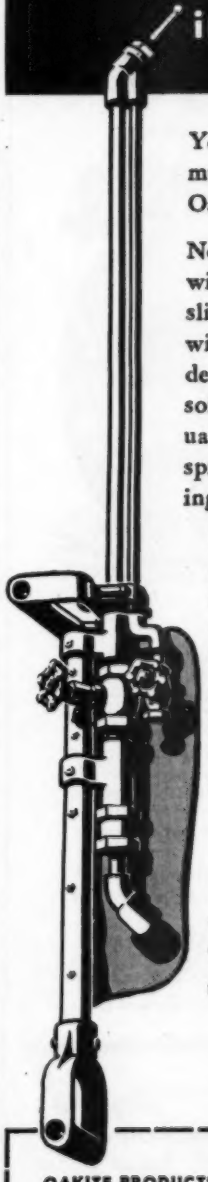

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No brushing, scraping, scrubbing with this dirt-dynamiter. Gun hits slime, grease, sizing, pitch, etc., with heat, force, powerful Oakite detergent. Breaks up, floats off all soils, even from places where manual cleaning can't reach. Lifts spray up to 12 feet above working level.

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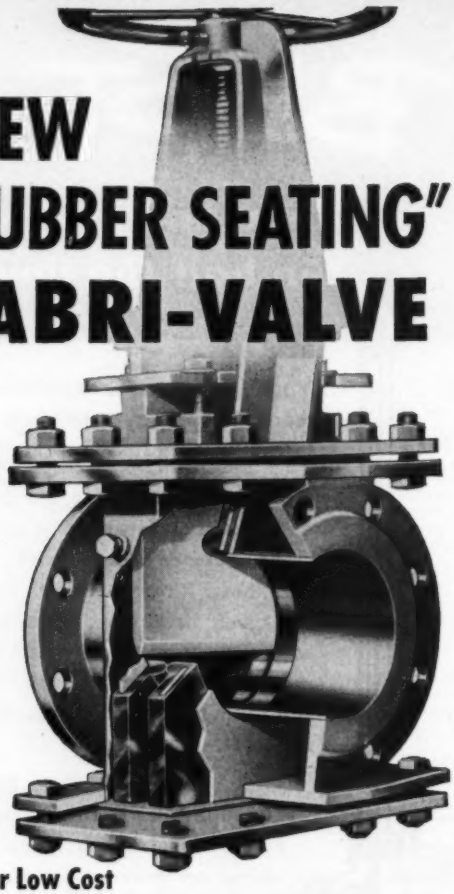

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New neoprene rubber seats eliminate "lip" area, thus preventing build-up or deposits. Rubber seats press tightly together when gate is open, insuring smooth flow of heavy solutions. Collection of stock fibers in chest area kept to an absolute minimum. Seating is easy to inspect while valve is in the line. The *only* stock valve to offer all these features:

- Lower original cost... cheaper to ship and install.
- Fabricated from stainless steel, monel or any alloy combination.
- Positive shutoff of normal flow or back pressure.
- Free flow from port to port... nothing for stock to "hang up" on.
- Sealed chest keeps collection of stock fibers in chest area to an absolute minimum.
- Special neoprene rubber seating prevents wear and galling on gate.
- Rubber seats can be inspected or replaced while valve is in the line.

Write or call for information or estimate

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FELKER BROS. • • • • — Marshfield, Wis., Distributor for the Mid-Western area

MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are quotations to mills, f.o.b. New York:

No. 1 White Shirt Cuttings	11.50 to 12.00
New Unbleached Muslins	13.50 to 14.00
Fancy Shirt Cuttings	6.75 to 7.00
No. 1 Percales	6.75 to 7.00
No. 1 Washables	3.00 to 3.25
No. 1 Light Silesias	7.00 to 7.25
No. 1 Light Prints	5.75 to 6.00
Light Flannelettes	7.25 to 7.50
Cottonades	3.75 to 4.00
Blue Overalls	6.25 to 6.50
Blue Cheviots	6.25 to 6.50
Canton Flannels, Bleached	10.75 to 11.25
Canton Flannels, Unbleached	10.75 to 11.25
Osnaburg Cuttings	7.75 to 8.00
Underwear Cuttings, Bleached	13.75 to 14.25
Underwear Cuttings, Unbleached	13.75 to 14.25
Khaki Cuttings—	
Sun Tan	7.00 to 7.25
Mixed	3.75 to 4.00
Linen Cuttings—	
American	7.25 to 7.50
White	13.00 to 14.00
Grey	13.00 to 14.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

Roofing	per cwt.
No. 1	1.10 to 1.20
No. 2	.85 to .90
No. 3 and 4	.70 to .80
Twos and Blues—	
Repacked	2.25 to 2.50
Thirds and Blues—	
Repacked	2.00 to 2.25
Miscellaneous	1.65 to 1.85
Whites, No. 1—	
Repacked	4.00 to 4.50
Miscellaneous	3.50 to 3.75
White, No. 2—	
Repacked	3.00 to 3.25
Miscellaneous	2.50 to 2.75

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	4.25 to 4.50
Domestic	4.50 to 4.75
Wool Tares—	
Light	4.75 to 5.00
Heavy	5.00 to 5.50
No. 1 Scrap Bagging	3.75 to 4.00
Manila Rope—	
No. 1 large	7.00 to 7.50
No. 1 small	6.00 to 6.50
Sisal Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.50 to 5.75
New Burlap Cuttings	6.00 to 6.50
Jute Threads—	
Foreign (Nom.)	6.00 to 6.50
Domestic	6.25 to 6.75
Strings—	
No. 1 sisal	5.25 to 5.50
No. 2 sisal	4.75 to 5.00
Soft jute	5.25 to 5.50
Mixed	3.00 to 3.25

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

Shavings—	per ton
Hard White Env. Cuts.	115.00 to 125.00
Hard White No. 1	90.00 to 95.00
Soft White, one-cut	75.00 to 80.00
Soft White, No. 1	55.00 to 60.00
Coated Soft	40.00 to 45.00
Fly Leaf No. 1	25.00 to 30.00
Fly Leaf, Woody No. 1	25.00 to 30.00
No. 2 Mixed Col. Woody	20.00 to 25.00
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	22.00 to 24.00
Mixed Books	16.00 to 17.00
Ledger Stock—	
No. 1 White	55.00 to 60.00
No. 1 Mixed (Colored)	35.00 to 40.00
Manilas—	
New Env. Cuttings	65.00 to 70.00
New Cuts, One-Cut— Extra Manilas	17.00 to 18.00
Manila Tab Cards, Free of Ground Wood	70.00 to 75.00
Colored Tab Cards	45.00 to 50.00
Kraft—	
New Envelope Cuttings	60.00 to 65.00
Tripled Sorted No. 1 100%	40.00 to 45.00
No. 1 Old Assorted	27.50 to 32.50
News—	
White Blank	55.00 to 60.00
Overissue	25.00—
No. 1 Folded	18.00—
Old Corrugated Containers	18.00—
New Jute Corrugated Cuts	22.00—
Mill Wrappers	15.00—
Box Board Chips	12.00—
No. 1 Mixed Paper	11.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.55—
Ground, cwt.	3.85—
Powdered, cwt.	4.70—
Blanc Fixe—	
Pulp, bulk, ton	100.00—
Dry, barrels	105.00—
Bleaching Powder— Drums, cwt.	5.00 to 6.00
Casein (Domestic Standard) 20-30 mesh (bags), lb. 80-100 mesh (bags), lb.	30.00—
Argentine, lb.	21.00 to 22.00
China Clay—	
Domestic Filler Bulk (mine) ton	10.50 to 16.00
Domestic Coating Bulk (mine) ton	17.00 to 25.00
Imported (ship side) Bulk (lump) ton	20.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.93—
Gelatine (silicon), lb.	1.25 to 1.35
Glye. (C.P.) drums, lb.	.33½ to .34
Litharge, powd. bbl. lb.	.14¼ to .14¾

MARKET QUOTATIONS

Rosin (Gum)—	New York, per 100 lbs.
E	8.65—
F	8.65—
G	8.65—
WW	9.10—
Rosin (Wood), carlots, F.O.B. South	5.00—
Salt Cake—	
Dom. bulk (wks) ton	19.00 to 23.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	22.00—
Soda Ash—	
Bulk (works) cwt.	1.45—
Paper bags, cwt.	1.75—
Soda (Caustic)—	
Solid drums, cwt.	3.70 to 4.45
Ground and flake, drums, cwt.	4.10 to 4.85
Sodium Silicate—	
60 deg. 55 gal. drums, (works) cwt.	1.60 to 1.70
40 deg. 35 gal. drums, (works), cwt.	1.35 to 1.40
Starch—	
Pearl, 140 lb. bags, cwt.	6.39—
Pearl, barrels, cwt.	6.39—
Paper (Sp.) bags, cwt.	6.39—
Powdered, barrels, cwt.	6.60—
Sulphur (Crude) (Mine) bulk, long ton	26.50 to 28.00
Talc—	
Dom. 100 lb. bags (mine) ton	25.00 to 28:00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig, bbls., lb.	.22½ to .23
Calcium Pig, bbls., lb.	.22½ to .23
Zinc Sulphide, bbls., lb.	11.50 to 12.00

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follow:

Bleached Sulphite	140.00—
Bleached Sulphite, Canadian	140.00—
Unbleached Sulphite	120.00—
Unbleached Sulphite, Canadian	120.00—
Bleached Soda	140.00—
Bleached Soda, Canadian	140.00—
Kraft, Bleached	145.00—
Kraft, Bleach., Southern	142.50 to 150.00
Kraft, Bleach., Canadian	145.00 to 150.00
Kraft, Unbleached, Northern	132.50—
Kraft, Unbleached, Southern	95.00 to 105.00
Kraft, Unbleached, Canadian	100.00 to 125.00
Kraft, Semi-Bleached, Southern	140.00—
Sulphite Screenings	72.50—
Sulphate Screenings	67.50—
Groundwood	82.50 to 87.50

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish	140.00—
Bleached Sulphite, Norwegian, freight allowed	140.00—
Bleached Sulphite, Finnish, freight allowed	140.00—
Unbleached Sulphite, Swedish	110.00 to 115.00
Unbleached Sulphite, Finnish, freight allowed	120.00 to 125.00
Kraft, Unbleached, Swedish, freight allowed	105.00 to 110.00
Kraft, Unbleached, Finnish, freight allowed	105.00 to 135.00
Kraft, Bleached, Swedish, on dock	142.50 to 145.00
Kraft, Bleached, Norwegian	

PAPER

Boards—

Prices per ton, delivered, 10 tons or more:

Plain Chip	85.00—
News vat lined chip	97.50—
Filled news	87.50—
Solid news	90.00—
White vat lined chip	135.00—
Chip tube and can stock	100.00—
Single manila lined chip	140.00—
Single jute lined chip	135.00—
Kraft liner	117.50 to 122.50
White patent coated:	
.020	160.00—
.018	162.50—
.016	165.00—

Book Paper—

Coated two sides

70 lb. No. 2 enamel, 25x 38-500, trimmed 4 sides.	4 cases $17.25 Carloads $16.30
45 lb. enamel, 25x38-500, trimmed 4 sides	4 cases $13.05 Carloads $12.10

Uncoated

55 lb. No. 2 offset, 25x38 500, trimmed 4 sides	4 cases $14.80 Carloads $13.85
50 lb. A Grade English Finish, 25x38-500, untrimmed	4 cases $14.05 Carloads $13.10
20 lb. envelope, 17x22-500, untrimmed	Carloads $12.40
16 lb. tablet, 17x22-500	Carloads $11.35

Rag Content Bond—	
Extra 100% rag	70.45—
100% rag	62.65—
75% rag	48.15—
50% rag	38.90—
25% rag	31.75—

Rag Content Ledger—	
Extra 100% rag	72.65—
100% rag	63.90—
85% rag	52.50—
75% rag	49.40—
50% rag	40.20—
25% rag	33.00—

Sulphite Bond—	
Air dry bond (Watermarked)	19.00—
No. 1 bond (M.F. watermarked)	15.00—
No. 2 bond (M.F. watermarked)	14.00—
Plain bond (M.F. unwatermarked)	14.00—

Sulphite Ledger—	
No. 1, M.F. watermarked	20.50
No. 2, M.F. watermarked	19.50
Plain, M.F. unwatermarked	19.00

News—	per ton
Rolls, Standard (Contract)	125.00 to 126.00
Rolls (Spot)	(Nominal)
Sheets	138.00—

Tissues (Carlots)—	per ream
White No. 1	1.75—
White No. 2	1.35—
Bleached Anti-Tarnish	2.20—
Colored	2.00—
Anti-Tarnish Kraft	1.65—
Manila	2.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.90—
Napkins, full crepe and embossed (12½ lb. to Mshts.) per cs.	.90—
Toilet, Bleached (M shts.) per cs.	9.35—
Toilet, Unbleached (M shts.) per cs.	7.90—

Towels—	per case
Bleached	6.80—
Unbleached	5.90—

Wrappings (Kraft)—	per cwt.
Standard wrapping	8.00—
Butchers, counter rolls	8.50—
Standard bag, mill rolls	7.75—
Shipping sack, mill rolls	8.00—
Gumming, mill rolls	8.25—
Asphalting, mill rolls	8.00—
Envelope, mill rolls	9.50—

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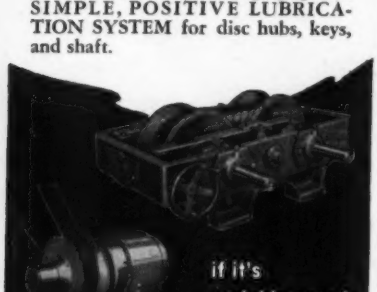

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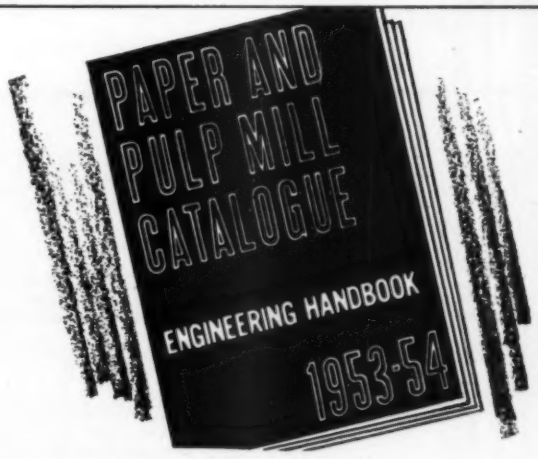

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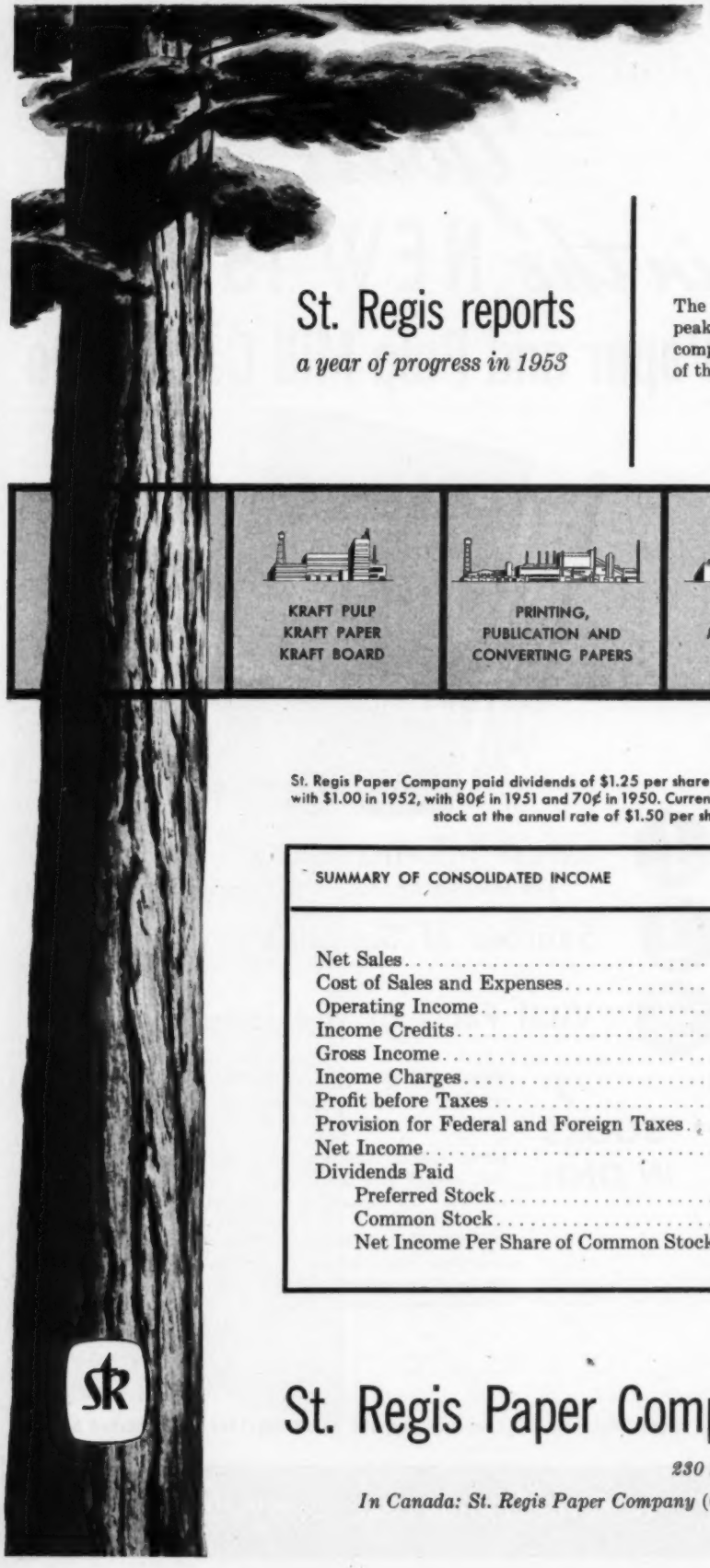

St. Regis reports

a year of progress in 1953

The annual report shows net sales at a new peak for the company at $200,334,208, compared with $182,712,239 in 1952. A copy of the report is available upon request.

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PUBLICATION AND
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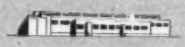


MULTIWALL BAGS

ST. REGIS PANELYTE

. . AND NUMEROUS PAPER SPECIALTIES

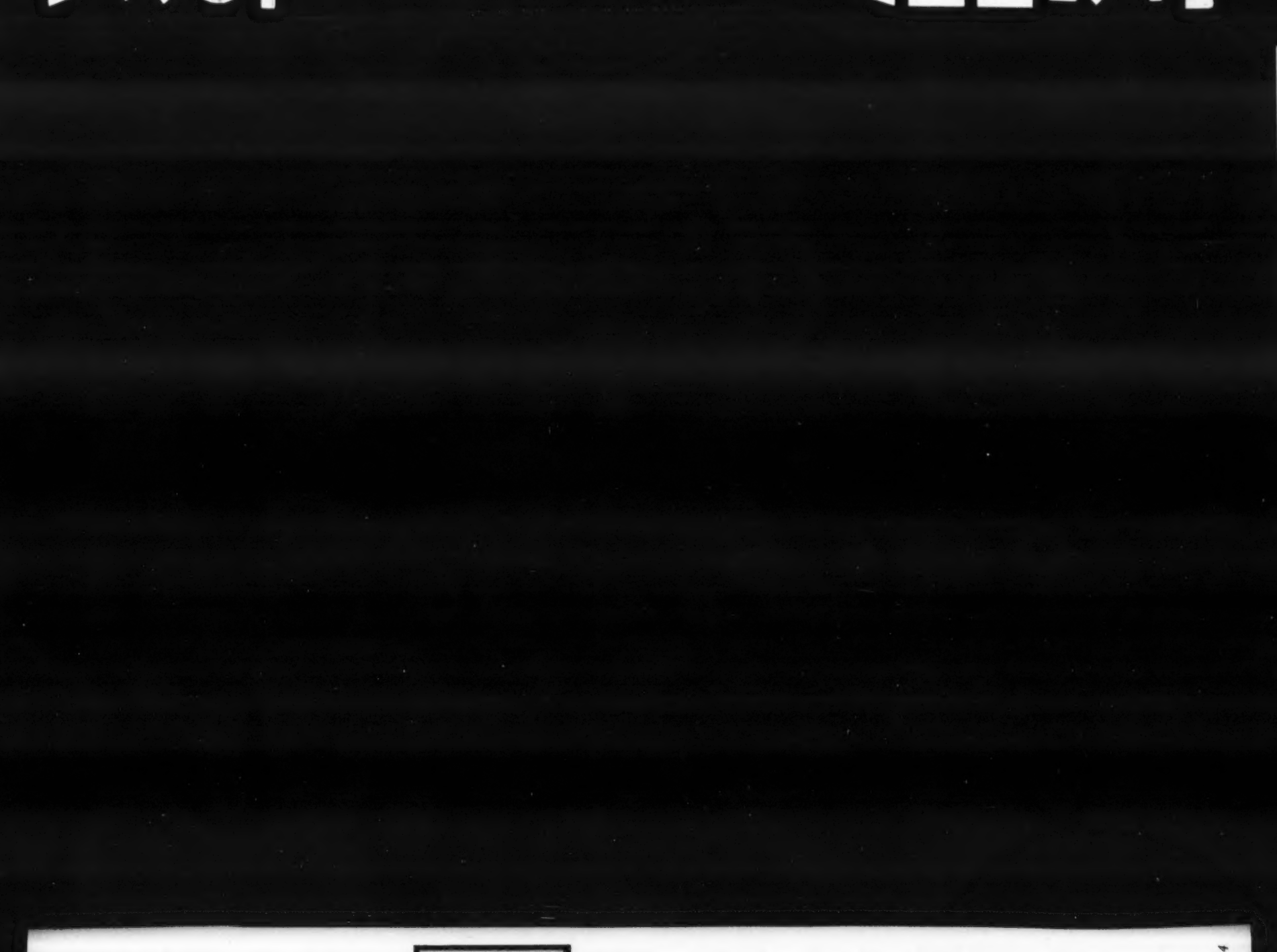
St. Regis Paper Company paid dividends of $1.25 per share on the common stock in 1953, as compared with $1.00 in 1952, with 80¢ in 1951 and 70¢ in 1950. Currently dividends are being paid on the common stock at the annual rate of $1.50 per share.

SUMMARY OF CONSOLIDATED INCOME	For the years ended December 31, 1953 and 1952	
	1953	1952
Net Sales	$200,334,208	$182,712,239
Cost of Sales and Expenses	173,076,318	158,165,799
Operating Income	27,257,890	24,546,440
Income Credits	4,652,303	1,135,723
Gross Income	31,910,193	25,682,163
Income Charges	2,547,083	1,441,788
Profit before Taxes	29,363,110	24,240,375
Provision for Federal and Foreign Taxes	13,206,207	11,538,398
Net Income	16,156,903	12,701,977
Dividends Paid		
Preferred Stock	664,660	693,308
Common Stock	6,550,449	5,170,714
Net Income Per Share of Common Stock	2.91	2.32

St. Regis Paper Company

230 Park Avenue, New York 17, N. Y.

In Canada: St. Regis Paper Company (Canada) Limited, Montreal



CATO

A NEW HEADBOX ADDITIVE

CATO STARCH is based on a new cationic derivative of starch for wet end addition on the paper machine. It meets the desired requirements of an internal starch additive. Due to the greater affinity of **CATO STARCH** to cellulose fibers, greater starch retention is obtained with stronger fiber bonding properties.

A CATIONIC STARCH DERIVATIVE

greater

PLUS EXCELLENT RETENTION OF FILLERS

strength

CATO STARCH improves strength factors such as mullen, pick, fold, tensile, etc., at low concentrations.

CATO STARCH offers excellent retention of fillers and pigments such as clay, titanium dioxide, calcium carbonate, etc.

CATO STARCH drains freely on the paper machine, often permitting increased machine speed without loss in strength.

CATO STARCH improves formation and finish of many papers.

CATO STARCH is applicable to paper and board ranging from high grade book and writing paper to kraft liners. Also many types of pulps and brokes.

Our Paper Technical Service is prepared to offer technical assistance in mill evaluations of **CATO STARCH.** For further information write: National Starch Products Inc., 270 Madison Avenue, New York 16, N. Y.

National

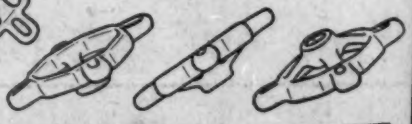
STARCHES RESYNS® ADHESIVES

WHAT TO LOOK FOR

when you buy a Bronze Valve

1 LOOK FOR DESIGN. Use the right valve for the right type of service at the right pressure. There is no such thing as an "all-purpose valve" . . . so don't try to make *one* valve do. *In the complete Lunkenheimer line, there are 125 basic bronze valves — each ideal for a certain type of service. Get your Lunkenheimer Distributor's recommendations.*

2 LOOK FOR OPERATING FEATURES, particularly those that make the valve longer-lasting and easier to use, such as the handwheel. *Lunkenheimer patented Non-Slip® Handwheel assures a firm, cool grip—makes it easy to close the valve tight, reducing wear and eliminating leakage. All Lunkenheimer Bronze Valves have the new Non-Slip Handwheel, along with many other exclusive operating features.*



3 LOOK FOR A LONG-WEARING STEM, since stem-thread wear is one of the most common causes of valve failure. *Lunkenheimer Bronze Valves have Stemalloy® Stems — an exclusive silicon-bronze alloy which completely eliminates stem-thread failure. Not one of the millions of Stemalloy Stems now in service has ever been returned because of thread wear.*

4 LOOK FOR CLOSE-GRAINED BRONZE, the mark of valve quality. Dense bronze not only increases the valve's strength, but makes it much more resistant to corrosion. *Lunkenheimer Bronze Valves are made of original Lunkenheimer alloys recognized by metallurgists as the highest-grade valve bronzes ever developed.*

Remember—The Price Of A Lunkenheimer Valve Gets Smaller And Smaller And Smaller With Each Passing Year Of Dependable Service

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